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LATHAM

ON

DIABETES.

W. Wilson, Printer, St. John's Square, London.

FACTS AND OPINIONS

CONCERNING

Diabetes.

BY

JOHN LATHAM, M. D. F. R. S.

Fellow of the Royal College of Physicians,

AND PHYSICIAN EXTRAORDINARY TO HIS ROYAL HIGHNESS THE PRINCE OF WALES.

Τῆς γὰρ αἱματοποιητικῆς δυναμέως, ὁπωσοῦν κατα τον ἴδεον ἔργον ὀκλασάσης, ἀγχίλοφ ἀψυδὴς ἢ των ὄυρων ἀκριδὴς θεωρία πέφυκεν.

ΘΕΟΦΙΛΟΥ ΙΑΤΡΟΣΟΦΙΣΤΟΥ ΠΕΡΙ ΟΥΡΩΝ.

" Non certiori fide, aut majori diligentiâ, pyxidem nauticam intuentur naucleri, quàm, pro idoneis medendi temporibus et modis, urinarum phænomena observare debent Medici."

Willis de Urinis.

LONDON:

PRINTED FOR JOHN MURRAY, FLEET-STREET;

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DEDICATION.

TO

H. R. Reynolds, M.D. F.R.S. F.A.S.

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS,

AND PHYSICIAN TO THE KING.

DEAR SIR,

THE following pages, which I thus dedicate to you in all the warmth of grateful friendship, will not, I hope, be found altogether unworthy of your perusal. Long, indeed, have I wished that some such opportunity might be afforded me, of testifying not only to

yourself, but to the world, that the services which I have received from you, in my early life, have not been forgotten, when that life is verging towards the vale of years:—Sooner, perhaps, some such epistle as the present might have been considered, by those who know less of me than yourself, as dictated by motives of interest and prospective benefit; but as, by the favor of an indulgent public, I have long since been raised into a state of affluence and independence, I cannot reasonably now, I think, be charged with views so disingenuous: be this, however, as it may, you will acquit me, I am well persuaded, of any such dishonourable imputations, and cor-

dially receive, as it is meant to be offered, this prefatory dedication.

It is now more than two years ago, since, in the full ardor of my professional pursuits, I was suddenly overtaken by disease, serious in its attack, and doubtful as to its event: I cannot easily forget the attentions of yourself, and of our very much lamented friend, Dr. Pitcairn, by which I was at last recovered from the immediate danger which so awfully threatened me:—Still, however, it was your joint advice that I should retire into the country, and withdraw myself from my profession for a year or longer, or until I should find myself in strength

sufficient to allow me to be occupied again in my usual avocations. The resolution, under such advice, could not be well delayed, and I retired to my own estate in Cheshire, the fair fruit of my professional industry, with full confidence in the opinions which directed me thither, and with a mind prepared for whatever issue it might please Providence to put to my afflictions: but, instead of resuming the busy situation in which my health had so severely suffered, and being unwilling to hazard the convalescence in which I was happily enabled to return to London, by exposing myself at once to the labours of a very active life again, I in a manner seceded into the

west end of the town, for the purpose of pursuing my business within a much more contracted circle.

During this interval of comparative leisure, I examined my mass of accumulated papers; and, finding many scattered scraps upon Diabetes, a disease to which I had for many years very particularly directed my attention, I endeavoured so to connect them, as to indulge a hope that they might not be without their use, if I should venture them before the public. To this determination, however, I could not immediately bring myself, inasmuch as although I might possibly have felt the vanity of supposing that I had done

something, yet there was the dread of finding that my opinions might be treated as trifling, and that critical severity, shewing my labours to be feeble and unimportant, might repay my attempts with chastisement: But to deprecate this, you will see that I have hit upon the expedient of artfully introducing, almost at the commencement of the book, a few bold associates, who, as strenuous and steady champions, will stand tolerably well against the first brunt of the battle; and, if they do not avert, they will at least blunt the edge of criticism; unless it should be objected to them, that they are brought into the field in new accoutrements, and not clad in their

own tried and accustomed armour:—But metaphor apart, I have endeavoured to give a value to my own labours, by associating them with those of some of the ancient physicians who have written upon Diabetes, whose opinions I have faithfully expressed, and as, I hope, without much diminution of their force, in exchanging their Grecian costume for an English dress: and although I may, perhaps, sometimes have rendered my authors in too literal a manner, and occasionally may be thought to have been too paraphrastic, yet I trust that I shall always be found to have given them in such a way as not to be misunderstood; for

I really have taken some pains with them, and should feel much mortified in being told that I had misinterpreted them, and that my labours had consequently been exercised upon them in vain. I need not mention to you, Sir, that, wanting the light which the discovery of the circulation, and the improved state of physiological enquiry, have since afforded, the ancient physicians very often reasoned upon erroneous principles; and, although their facts were right, their philosophy was often wrong:—Hence, you will see, that the language of Galen and of Aretæus, though not always philosophically correct, according to our modern

notions, was nevertheless the language of truth, and the perfect model of descriptive excellence.

Of some authors of the subsequent ages, and of those, more especially, who have lived nearer, and even within, our own times, I have also availed myself: I have not time to appreciate their merits in this place, nor, considering to whom I am addressing myself, can it be at all necessary:—The names of Willis and of Sydenham, of Cullen and of Heberden, of Baillie and of Rollo, will live in medical history long after the humble author of the present work shall have been entirely forgotten.

The *Facts* which I have stated in the following pages, you, Sir, are well convinced, will not be disputed to be such by those who have any knowledge of me; but the *Opinions* which I offer are purposely advanced for discussion: and if they conduce, in any degree, towards the better understanding of Diabetes, or a greater diligence in discovering it; if they afford any arguments by which practice can be more certainly regulated, or any analogical combinations by which some other diseases may at all be elucidated; if, in short, the quantity of human misery can even, in any manner, be diminished by them, and a prospect, however remote, be thereby opened to our further

improvement, in any department of our profession, my wishes, whatever may at last be the fate of my Opinions, will be most amply gratified.

I have the honor to be,

Dear Sir,

With the greatest respect,

Your most sincere Friend,

And faithful Servant,

J. LATHAM.

Harley-street, Sept. 29, 1810.

ADVERTISEMENT.

I DID not know, until the following pages were announced as ready for the press, that a French work, entitled "*Récherches et Expériences Médicales et Chemiques sur le Diabéte sucré ou la Phthisurie Sucrée,*" had been published at Paris, in the year 1803: It was brought to my knowledge by a very able critique in the third volume of the *Edinburgh Review.* It is mentioned, too, I since find, by Dr. Bardsley, in his *Medical Reports.* Whether it may contain opinions similar to those which

I may have adopted I cannot determine, not having seen or known more of the work, or its doctrines, than the Reviewers have explained of them: but I think it right to acknowledge, that the *Acid of Phosphorus*, which is there mentioned to have been given as a remedy in Diabetes, must have been so given before I employed it; and, therefore, if there be any merit in the priority of having so used it, the French authors are certainly entitled to it.

But, willing as I am to give my feeble testimony to the ability with which the Edinburgh Reviewers have treated the subject of Diabetes, and much as I admire the force of their

arguments and the elegance of their language, in almost all the articles that have come under their discussion, I must not, through the dread of future censure, shrink from maintaining an opinion directly the reverse of one which they have, in their characteristic boldness of manner, there promulgated: I am alluding to the attack which, as touching his account of Diabetes, they have made upon the character of Aretæus, although they state him, in other respects, to possess "acknowledged accuracy."—I must confess that I have not been able to see, in his description of Diabetes, any thing which renders "his account very suspicious;" neither can I find in it "his

own confession that he had seen very few cases" of it; nor can I discover any ground for suspecting the authenticity of his account, " from his manner in which he relates the symptoms:" for according to my judgment " he described the disease as he saw it, and wrote from observation, not from the reports of others;" and his account of it " impeaches [not] his *acknowledged* accuracy." I certainly must allow, with the Reviewers, that " nothing but ischuria could occasion many of the symptoms and feelings" which he describes; but I must take leave to add, that hence has arisen the mistake into which, I think, they have inadvertently fallen; for Aretæus, having

already finished his description of Diabetes, is in that place not *again describing*, but *illustrating it;* and that he is not (as many have hastily concluded) attributing such " symptoms and feelings" to Diabetes, but is then actually describing a case of ischuria in the effects produced by the poisonous bite of the dipsas; shewing, analogically, that, as from the bite of that serpent, as a cause, known and undoubted effects are produced, which often affect the urinary passages, so as to terminate in an invincible ischuria, so from a secret evil in the habit, which some acute disease may in its crisis leave behind it, a poison may be produced, which may also, in its peculiar way,

affect the kidnies and bladder, and become the true cause of Diabetes.

Liberality will not, I know, be wanting in the very able and learned Reviewers to confess their error, should they feel themselves convinced of it; but if I myself should have proved mistaken, and should erroneously have conceived the meaning of Aretæus, I hope to be favoured with their correction. I am conscious indeed, that many imperfections must be found in the following sheets; many mistakes, too, may possibly occur, which I may not have detected---the arrangement of the whole may be faulty, and the doctrines obscure; but, should these be

substantially pointed out to me, I shall be happy in availing myself of any observations (be they severe or otherwise) which may tend to illustrate my Book, and render it more worthy of public notice.

J. L.

satiable thirst; with a dry harsh skin, and clammy, not parched, but sometimes reddish tongue; and with a frequent excreation of very white saliva, not inspissated, but yet scarcely fluid: and as the disease proceeds it is accompanied often with a peculiar *hay-like* scent or odour issuing from the body, and with a similar sort of halitus exhaling from the lungs, and with a state of mind dubious and forgetful;—the patient being dissatisfied, fretful, and distrusting, ever anxious indeed for relief, but wavering and unsteady in the means advised for the purpose of procuring it.

As emaciation advances, cramps or spasms of the extremities sometimes supervene, the pulse is more quick and feeble, and the saliva more glutinous: and when the strength is almost exhausted in the still more advanced stage of the disease, the lower extremities often become œdematous,

and the skin cold and damp: the diabetic discharge is then frequently much diminished, and is sometimes even found to become more urinous for a few hours before death happily closes the distressing scene.

Such are the usual and common symptoms of the disease; but occasionally the urinary discharge is neither so copious nor so limpid; and although it has properly enough been described as being like a diluted mixture of honey and water, in colour, in smell, and in consistence, yet it sometimes happens that the quantity discharged is not large but highly amber-coloured, containing sometimes a very great portion, and sometimes very little or nothing of saccharine matter:—the appetite and thirst will also occasionally vary, as more or less of nutritious particles are carried out of the system by the urinary organs; and accordingly, towards the termination of the dis-

ease, when the secretion by the kidnies ceases to be excessive, the desire for food and drink becomes nearly natural.

I might observe too, that in many diabetic patients there seems to be a peculiar destruction of the fangs of the teeth with the alveolar processes; and moreover, that there is often also, both in male and female, at the extremity of the urethra, a smart sensation of heat, (produced, as I should conceive, by the constant stimulus of the saccharine matter) which usually terminates in excoriation, accompanied with mucous discharges, and in males occasionally followed by phymosis and other uncomfortable consequences.

I would distinguish Diabetes into *saccharine* and *serous:* But it might admit perhaps of another, and a better distinction, into that which advances *rapidly* to its fatal termination, and that which, from its compara-

tively slower progress, may properly enough be denominated *chronic*. But whether *saccharine* or *serous*, the disease will, during its progress, partake sometimes more of the nature of one than of the other; and will be *rapid*, in proportion as the discharge may contain more or less of *sugary* matter; and will consequently assume more of the *chronic* form, as the discharge loses something of its sweetness, and becomes more, or altogether *serous*.

The *saccharific* form of this disease is certainly the most dangerous; although, from the waste of serous fluid, even under the most favourable point of view, the system becomes also very much debilitated, and, unless duly supported and regulated by appropriate means, at last equally sinks under this state, as well as the other.

I need not here enter into an enquiry about the principles of Aliment, nor of what

this, as it respects the system in general, really consists: the investigation might be curious, and, if we consult Cullen, we shall find it so to be, but not satisfactory. It will be sufficient, in this place, for me just to have observed that, from the statement already made, although the diabetic discharge seems to carry nutriment out of the body in proportion to its sweetness, yet we also know that, from the absence or deficiency of some principle, in a manner perhaps not well understood, the food may be conveyed into the system, and not support it; and that there may be a loss or escape of nutriment, and consequent emaciation, notwithstanding there may not be found, in the urinary evacuations, any saccharine matter whatever, either by the actual evidence of our senses, or by any other experiments.

But before I proceed even to hint at what

I may conceive to be the deficient principle, or to deliver any observations of my own concerning the nature of Diabetes, I will endeavour, as accurately as I am able, to collect those of some of the most ancient fathers of our profession, to whom the science of medicine in this, as well as most other maladies, stands eminently indebted. After these I shall detail the opinions of some authors who have lived nearer our own times, and of those who may more especially be considered as the founders of English physic; and in the sequel I shall shortly mention those of a *few* of our own more immediate contemporaries, by whose labours on such an obscure disease the public is more particularly obliged; and in the hope of having thus informed my reader of all that appears to me to be useful upon the subject, I shall introduce him (with becoming diffidence, I trust) to such facts and opinions as I have

myself been able to collect and arrange for his consideration, coupled with such observations as may properly seem to be connected with them.

It is not perhaps very material to our purpose whether Hippocrates understood any thing respecting Diabetes or not. He certainly does not mention the disease expressly by name, but I think he describes it in its consequences. Indeed the disease seems not to have acquired a name until the times of Galen and of Aretæus: But from both of these writers, who write familiarly enough upon the subject, we may reasonably infer that it was known to have existed by those who had preceded them: and the very mention of it as an uncommon disease, with the statement that it was considered as something even miraculous, whenever it occurred, is argument sufficient that when occurring, it would always excite much in-

terest, and consequently would be very likely, by the writers of those days, to be accurately described; and Galen expressly says (as we shall soon see) that "*some* called this uncommon disease Dropsy into the chamber-pot, *some* the Diarrhæa into urine, *some* the Diabetes, and *some* the Dipsacus."

But we know that Hippocrates has recorded diseases to which he has not given distinct appellations; and we can readily recognize some which are now well known, although he did not chuse to characterise them in any other manner than by describing their symptoms. In this manner I think we may discover that he had a true knowledge of the nature of Diabetes; otherwise I am at a loss to account for the very accurate conclusion which he draws in his last aphorism, where, speaking of "Excretions *by the bladder*, by the bowels, by the fleshy

parts or by whatever way the body departs out of its natural habits," he says, "these must be considered; for if such departure is but trifling, the disease will be trifling also; if much, the disease will be considerable; *and if very much, that it then becomes mortal:*" An observation certainly as applicable to the superabundance of excreted fluid from the bladder; as to the other cases, which he secondarily mentions in the same aphorism.

We also find him among his general observations in his Prognostics, stating, that such urines as were offensive to the smell, *such as were like water*, and those that were black and thick, portended death *more than any* other kinds of urine.

In his Prorrhetics too he says, that the urine, in its quantity, should correspond with the drink, and be always equal to it; that it should pass as free as possible, and

should, in a slight degree, be thicker in its consistence than the fluid which is drunk; but *if it be like water, and more in quantity than has been prescribed to be drunk*, it is an indication that the patient is not attentive to the directions given him, but that he is drinking too great a quantity, *or that he cannot be nourished so long as he continues in such a manner to void his urine.* In his Epidemics also he mentions urine similar in colour to the food and drink as indicatory of colliquation, and has many other observations relative to clear, and thin, and diffuse urine in several parts of his works, which he comments upon, and connects with a pernicious tendency; but as they cannot exclusively be referred to Diabetes, I must forbear to press them into any further argument in proof of his knowledge of the disease.

We next come to Galen, and as what is

stated in "the book concerning urines attributed to him" may be considered as introductory to his account of Diabetes, I shall shortly transcribe his opinions; he says, that "such urines are bad as exceed the quantity of liquid drunk." (Vol. viij. p. 348); and in the next page we find the observation, "that urine should be in proportion to the liquid;" and he has several observations also about thin and crude urine, in cases unconnected with febrile action, respecting diseases of debility. In his Compendium on the same subject he remarks, (p. 349), that "the urine which is passed thin, and remains so, indicates an excessive inconcoction (απεψιαν) of the venous kind." And with respect to colour (p. 350), he expressly says, that "such as is colourless, (λευκον) indicates a good deal; for it shews either debility in the power of the system, such as happens in old people and chronic

diseases, or it arises from an obstruction of vessels, or from the *quantity of liquor drunk*." And indeed throughout the whose treatise it is wonderful to observe the accuracy with which Galen handles this subject of urines: and on reading it I could not but reproach myself for the neglect with which, in common, I fear, with many other physicians, I have treated it; for his own observations, with those of Hippocrates, seem to be digested together. It is out of chronological order, but it will not the less elucidate the subject if I go on to transcribe from the same book, (the edition of Charterius, 1639, which is now before me), such other opinions as may properly enough become a preface to Galen's sentiments; and here will be found, not only most that could be collected from Hippocrates, but much valuable information from other authors, as Philagrius and Paulus; in the last of which

we have the name of Diabetes expressly given to that kind of urine " which is very watery, and which is there called the very worst sort of unconcocted urine:"—In the same collection too is the book of Theophilus, an author, who certainly lived before the time of Alexander Trallianus: for this Theophilus (Jacobus Psychrestus) is commended by him, " as an eminent and pious physician, who was archiater to Leo the Thracian, before the year 474. Friend's History." Theophilus begins with noticing the labours of Hippocrates, and of Galen, upon urines; and also those of Magnus, an author now unknown to us; none of which he considers as perfect, but gives us, as he conceives, a more accurate treatise of his own; he tells us expressly, that " when the sanguifying faculty, in any manner whatever, fails in its proper work, the diligent observation of the

urine becomes the unerring herald of it:" that the "urine is the matter strained from the blood, (περιηθημα τῦ ἁίματος), which some call a serous, and others a watery excrement; and some again have denominated the ichor of the blood."—He goes on with several observations of considerable importance; and when he comes to treat upon that sort of urine which is "thin in its consistence, and colourless,"—after having said that it denotes in healthy people, that such are in the habit of eating and drinking well, that in children it is an unhealthy sign; and that indicating a weakness of power, as in natural old age, it signifies also that infirmity which arises from a protracted malady, called by skilful physicians, Old Age from Disease, (ἐκ νοσυ γεραις); he then expressly says, "urine thin and colourless, made in large quantity and frequently, signifies Diabetes, which some learned physi-

cians have called Diarrhæa, and the most distinguished among them, Diarrhæa into urine; but which others have denominated Dipsacus."

But it is now time to return to Galen, from whom (De Locis affectis, vol. viij. p. 511), I translate the following account of Diabetes: "There is," says he, "another affection of the kidnies, by which a thin ichor of the blood goes off by the urine, not unlike the discharges which occur at first in hepatic diseases, except that these appear to have rather more blood in them; and this happens both from such a disposition in the kidnies, as in the liver we have called Atony, and from the dilatation also of the orifices or pores, or whatever name you choose to give them, which strain the urine from the vena cava into the kidnies; for here the kidnies seem to be affected with that very uncommon disease, which

some have called the Dropsy into the Chamber-pot, some the Diarrhæa into Urine, some the Diabetes, and some the Dipsacus. I have as yet only seen it twice; and in those cases the patients were immoderately thirsty, and for that very reason drank copiously, and quickly voided by urine the liquor such as it was taken in: this disease is moreover, in respect to the kidnies and bladder, very nearly the same as the lientery is in the stomach and intestines. Now, with respect to lientery, it has been described in its proper place; where we shew, that not only the stomach, but also that every part of the intestines quickly go on to discharge both the solids and fluids that have been swallowed, not being able to bear, not even for a short time, without inconvenience, either their weight or their quality: and with regard to the abundant and speedy transmission into the bladder, it is impossible that

atony of the stomach, or jejunum, or small intestines, should be assigned as the cause: for if not being able to bear the weight of the drink, they go on to excrete it, what impediment is there *to its excretion* by stool, as we see to be the case with lienteric patients? For quickly passing through so great a convolution of intestines, not only is the food excreted, but the drink also. But the distribution into the liver from all the parts throughout the belly we have already known to arise neither from atony of the liver, nor of the veins in the mescutery, nor of those of the stomach, as neither of those which go from the liver to the kidnies; for it has been shewn by us in our comments upon natural powers, that the liver attracts nourishment to itself from the stomach, by means of the meseraic veins, in the same manner as trees draw nourishment from the earth by their roots: and

the kidnies too have been shewn to attract the watery part in the blood; not indeed that the bladder attracts from the kidnies, as neither that the intestines attract from the stomach; but that excreting, the kidnies for instance transmit into the bladder through the ureters, and the stomach into the jejunum through the intestine arising from it, which Herophilus called Duodenum Digitorum, giving it this name from its length: so that one may lay down as the cause the atony of the kidnies, as being no longer able to retain the urine in themselves, but not atony of the other parts through which the liquor drunk passes. But again, if any objector should ask, How can the kidnies, in this state of atony, draw the urine so speedily into themselves? may we not answer, that as in respect to the stomach the appetites are very keen in some lienteric persons, so in

respect to the kidnies, there is also a great appetite; and that for this reason, they draw the urine into themselves from the vena cava, but are immediately oppressed by the avidity of such attraction? And, in like manner also, in respect to those canine appetites, as they are called, we see indeed some persons greedily filling themselves, but in a little while afterwards either seized with vomiting or diarrhæa: for this is observed to happen, not only in cases of preternatural appetite, but also to some animals that are undeniably healthy; as for instance, to those birds which they call in our part of Asia, Seleucides, for they feeding insatiably all day long upon locusts, quickly excrete them; and in other animals too such a symptom appears to exist conformable to nature. As therefore the canine appetite, at the orifice of the stomach, existing at the same time with the inability

to bear the weight of the ingesta, necessarily compels at once a voracious accumulation of food, and a speedy discharge of it; so, after this very manner, in the kidnies, the appetite for this serous moisture, when attended with atony of their functions, while it excites an abundant attraction of this water, urges also its immediate excretion into the bladder. How then, some one perhaps may say, does the diarrhæa into urine come on suddenly, but the lientery and the canine appetite not so, but in the course of several days? I answer, there is a definite distinction between the beginning, the increase, and the acmé of disease; for the appetite of the stomach for meat and drink is an animal action, not existing but with our perception of it, while that of the kidnies is a natural action, and without our consciousness; so that not even when it has reached its acmé is there

any perception of it as there is of canine appetite: it is a reasonable supposition, therefore, that it begins by slight degrees, and becoming greater, first draws the serum of the blood from the veins without our being sensible of it; and when it shall have attracted all this, and discovers the blood in the veins to be deprived of such moisture, that the vessels thus dried attract moisture again from the liver, and the liver in turn that from the intestines and the stomach: and when the veins at the orifice of the stomach become dry, that the man then grows eager for drink, and is sensible of his condition, and that then having satisfied his thirst, the veins which communicate between the liver and the stomach being parched up, instantly imbibe all the liquor with avidity, and from them the rest in succession, until it is conveyed to the kidnies: for it hath been shewn in

our comments upon the natural functions, that not only the drink but that the aliment also is carried all over the body by this very method of successive attractions. With respect to the celerity of its progressive stages, therefore, this disease is similar to the licutery: and, indeed, the analogy holds good, as far as the constitution of the kidnies resembles that of the stomach; but in as much as the whole work of the transmission, before it arrives at the kidnies, is a continued action of natural (and therefore imperceptible) energies, operating by the influence of the attractive power, so far they differ from each other: although even in these operations there is one thing similar, viz. the analogy between the attraction from the vena cava into the kidnies, and the first deglutition of those things that are transmitted from the mouth into the stomach: but the operations pre-

vious to this analogous action are exclusively peculiar to the diarrhæa into urine: and that some are not right in supposing the affection of Diabetes to belong to the stomach, in the same manner with canine appetites, we may learn from the case of those who filling their stomach through excessive thirst, retain there for the most part what they have drunk: for these four symptoms ensue from the drinking in excessive thirst; the first of them is vomiting; the second is a quick excretion by the lower belly by diarrhæa and lientery; the third is the retention in the stomach of the greater part of the liquor drunk; and the fourth of them is this very disease of which we are speaking, whether one pleases to call it Diabetes, Dipsacus, or Diarrhæa into Urine; for we are not anxious about the propriety of the name, but that, in order to its cure, we may find out the methods of turning it

both from the part affected, and from its disposition thereto.

"But there is another disease exactly similar to this Diabetes, on account of the quantity of food which is neither undigested nor excreted by stool, nor produces plethora, nor abundantly nourishes, but which is nevertheless very quickly dissipated; but it is neither so uncommon as the Dipsacus, nor so incurable, since if we discover it before it arrives at its height, there is not much difficulty in curing it: for when in the case of a person that eats even twice his usual quantity of food, his body wastes away without diarrhæa, the disease is thought of little consequence, either by private individuals, or by physicians; but when this happens to one that eats three times the usual quantity, assistance is afforded before he proceeds to a four or five-fold quantity of food: and again, we may

reasonably suppose that this disease originates in a rapid dissipation, each part preserving its attractive power in conjunction with that which is properly called its *appetitive* power. But the cause of extreme thirst, without Diabetes, exists in the stomach, and particularly its orifice, when it undergoes a hot and dry dyscrasy, or both together: and next after the stomach the liver, and particularly its depressions, which are in an inflammatory state, together with the parts about the mesentery and jejunum, as well as the belly itself, and those also about the stomach and lungs: the cause (as it were a root) of such a symptom arises from an erysipelatous disposition of the parts inflamed, to which generally marasmus succeeds, different in different cases, as has been shewn in the discourse concerning it. Now these have been mentioned as having symptoms in common with the

affections of the kidnies: but the Diabetes may be defined to be a peculiar affection of the kidnies themselves, analogous to the canine appetite at the orifice of the stomach, with atony of the retentive power; for if we suppose that it exists without excessive appetite, no urine worth notice will in the first instance ever arrive at the kidnies; and if without atony of the retentive power, the rapid discharge of urine will not follow."

After Galen comes Aretæus, whose history of Diabetes I have endeavoured, as faithfully as I am able, to translate: and I hope I may have rendered his meaning correctly, although his language may certainly be considered as too dense for literal translation. His account of the disease is the following:—

"The disease of Diabetes is something miraculous, not very common among men,

being a colliquation of the flesh and limbs into urine. Its cause proceeds from moisture and cold, as in dropsy. It has the usual urinary course, namely, the kidnies and bladder; for the patients never cease voiding their urine, but as from the opening of the water-ducts the stream is perpetual. As the nature of this disease is chronic, it is generated by length of time: but short is the life of man when its establishment is once compleated: for the emaciation is rapid, and death generally soon follows, and existence, while it lasts, is loathsome and tormenting. The thirst is insatiable, and the frequent draught of liquid bears no proportion to the excessive discharge of urine, for the urine is more abundant; and one cannot prevent either their drinking or making water. But should they a while refrain from drinking, the mouth becomes dry, the frame parched,

and the viscera seem to be on fire:—overcome with nausea, distressed with perplexity, in no long time they die; so burning is their thirst:—but what device can prevent the propensity to urine; or what sense of shame is superior to the painful necessity? But if for a time they do possess the power of restraining it, they swell in the neighbourhood of the loins, the privates, and the hips; and when again they let it pass, they emit the urine with a scalding heat, and the swelling of the parts is removed; for the superabundant water is distributed into the bladder.

"When the disease is fully formed it is easily known; but during its formation the patients become parched in the mouth, the saliva is white and frothy, to all appearance from thirst, while as yet there is no real thirst—there is a heaviness of the hypochondria: then there is a sensation of

heat or cold from the stomach to the bladder, as marking the approach of the advancing disease. But still, however, they make but little more water than usual: there is thirst too, but not yet great.

"But when the disease increases still more, there is a degree of heat, small indeed, but biting, seated in the bowels: the surface of the belly is corrugated, the veins become prominent, and the whole habit emaciated: and when the secretion of urine and thirst become at that stage greater, and when a sympathetic affection is sensibly felt at the extremity of the penis, they instantly discharge their water.

"Hence, it seems to me, that Diabetes has acquired its name, being a kind of Siphon, by reason of which the water cannot remain in the body, but makes use of man as a passage for its egress. Thus patients continue for some time, although not very

long, because they discharge their urine with pain, and a shocking emaciation ensues; for nothing of any consequence, from the liquid drunk, is added to the system, and an immensity of flesh is dissolved into urine.

"As a cause then, some one of the acute diseases has tended to the formation of this; for in their crisis maladies are found to have left behind them some secret evil in the habit: and it is not improbable, that one of those poisons which affect the bladder and kidnies, may be the true cause: for if a person be bitten by the Dipsas, a similar affection arises from the wound. Now the Dipsas, which is a serpent, if it bite any one, kindles an insatiable thirst;—for then men drink abundantly without effecting a cure for the thirst; but from the insatiable desire of liquid they overcharge the belly: and if any should be distressed

from this distension of the belly, and feel pain, and still refrain from drinking, even for a short time, from his excessive thirst he drinks again abundantly: and such is the alternation of evils, for thirst and drink naturally conspire to destroy him. Some indeed do not emit their urine, neither is there any other vent for the liquid imbibed: therefore, from the continued desire of drinking, and the superabundance of liquid, and the distension of the belly, they quickly burst asunder."

The last of the ancient authors whom I shall transcribe is Alexander Trallianus, whom I consider as a writer of no common merit.—He writes as follows:

"When the urine is excreted in too copious a quantity, and that frequently, and accompanied also by thirst, it is called Diabetes: it is some such affection as happens to lienteric patients, where the food, which

cannot be retained, even for a short period, in the stomach, and be changed and converted into nourishment, is excreted from it: *for which reason* some call the disease not only Diabetes, but also Diarrhæa into urine, on account of the liquor directly flowing through the body: and as the thirst is immoderate, in consequence of the moisture being altogether excreted, it has been called Dipsacus: such then it is, and such different names has it obtained—and it arises as well from the weakness of the retentive power in the kidnies, as from the strength of the attractive power, which, on account of the heat of the system, necessarily draws beyond measure, not only the moisture that is in the veins, but that also of the whole body; wherefore to this heat then we find that dyscrasy must be the direct consequence; and the whole method of cure will therefore consist in animating

and invigorating the system. And we must also temper and moisten the whole body, since it must of necessity have become dry, on account of the great excretion of urine: we ought, therefore, to supply them with more drink indeed than is common, but yet not to the full indulgence of their thirst; and we should also give them food difficult of digestion, so that the aliment may not easily be attenuated and pass away in urine; for the liver being too hot and acrid, renders the stomach dry, the food attracting and absorbing the moisture. We must, therefore, of course, give food in considerable quantity; and it must at the same time be nutritious, so that it may afford sufficient support."

It would be waste of labour, I think, to copy further from the more ancient Fathers of medicine; and I do not know that very much would be gained by consulting any

of those that lived in the times intermediate to those of Willis: I will, therefore, at once, step down to this last mentioned author, who may be presumed to have collected from those who lived immediately before him, all that was useful upon Diabetes, and to have incorporated what he so collected, with his own observations, into his invaluable treatise: the whole of which I shall venture to translate, in the hope that, when the name of Willis is hereafter mentioned, he may sometimes also be consulted.

He was born in the year 1627; and, according to Pordage, a physician who translated him, was a man of whom it was said, that he was "equally good as learned; that he also exercised himself in the practice of piety, and who was most conversant in that of physic." His loyalty too was as conspicuous as either, for he bore arms, "in the University Legions, for his king, against

the usurper Cromwell." During the protectorate he lived at Oxford, and published some of his earlier tracts. At the restoration he proceeded to his Doctor's degree, and became professor of Natural Philosophy; and about the year 1667 came to London, where he published, at intervals, his other tracts, and where, until the time of his death, which happened from an inflammation of the lungs, (then epidemical) in November, 1684, he was in the very fullest exercise of his professional duties. It has been the singular fate of this great and learned man, notwithstanding as much sound and useful knowledge issued from his pen as is to be found in any medical work in existence, to be but little known to us; for if his merits had been better understood, ample justice must long since have been rendered to his opinions: but the erroneous philosophy of his time, and the false chemistry of his day,

have not even yet so obscured his very important facts, which are every where crouded upon us in all parts of his works, as to render them useless to the present generation: for whoever shall consult Willis, with a candid and unbiassed mind, must discover in him a judgment of no common measure, and an abundant store both of theoretical and practical information. His single account of Diabetes would be sufficient to bear me out in any eulogy I might bestow upon him: for that accuracy which first detected sugar in Diabetic urine, and that learning with which he has illustrated the disease, have not fruitlessly been employed in exploring the sources, and investigating the circumstances belonging to every other subject on which he has written. His Treatise on Urines, like that of Galen, affords a fund of information even to those who may have already considered the subject

with attention, and is not at all inferior to that of the great author of antiquity, whom his learning evidently enabled him to consult; and whom, in illustration and argument, he undoubtedly surpasses. Our English Galen, however, is not an author that should be put into the hands of the noviciates of our profession; but when the charms of theory are as it were fading, and observation shall have condensed them into a more solid form, and experience shall have matured the judgment, then the mind will be prepared to appreciate the ore which is so richly imbedded in its matrix, and convert it by an easy assay into a most precious metal. With these remarks I shall not hesitate to lay before my reader the whole of what Willis has written upon Diabetes; and after what I have thus premised, shall not presume to doubt about the profit and advantages which must accrue

to him if he works the mine with proper discrimination.

"The Diabetes so seldom occurred among the ancients, that many of their physicians have never mentioned it; and Galen himself had seen only two cases of it: but in this age, which is so much addicted to drinking, and the stronger sort of wines more especially, instances of this malady may be considered as of almost daily occurrence. But although the disease may now be familiar to us, and in its form sufficiently apparent, yet, with respect to its causes and its true nature, we are still nearly ignorant. Upon these that I may theorize, or rather offer some conjectures, I will first describe all, or at least the principal phenomena of the disease; and then I will endeavour to investigate from what part or humour being in fault such phenomena arise.

"It is called Diabetes, from the word Διαβαινω, which signifies to pass through, being too quick a transmission of the fluid drunk; and it is also called a Flux of Urine. Those who have this complaint make more urine than the quantity of fluids taken all together: they have moreover a continual thirst, and a slow fever (a kind of hectic) always on them. But what some authors affirm of the drink being again discharged, little or nothing altered, is very far from being true; for the urine, in all that I have seen, (and I believe it will universally hold good) differed not only from their drink, and from every other fluid in the animal body, but was like as if it had been mixed with honey, or with sugar, and had a wonderfully sweet taste. The reason of the mistake which I have just mentioned, must, I think, have been the color of the urine, which always appears crude and watery, like that

in chlorosis or in dropsy: but that we may investigate the causes of these symptoms, we will first inquire, why the excretion of urine is so abundant and so quick, and then proceed to give an account of the other circumstances attendant on this disease.

"As a cause of Diabetes some have assigned an attractive power in the kidnies themselves; but in this I do not agree with them, for the blood is not attracted, but driven thither by the heart's action: neither is the serum drained or drawn out of the blood as it passes through them, but partly by percolation, and partly by a sort of fusion or precipitation, seems to be separated from it, as I have above, in the treatise concerning urines, clearly demonstrated: wherefore I conclude that Diabetes is rather and more immediately an affection of the blood than of the kidnies, and that it thence has its origin, inasmuch *as the mass of*

blood becomes as it were melted down, and is too copiously dissolved into a state of serosity; which indeed is very manifest, from the quantity of urine so immensely increased, which cannot have arisen from any other cause than from this solution and waste of the blood: whence also the blood which is left in the body, the serum being thus copiously abstracted from it, becomes much thicker and more apt to coagulate, as we may infer from the quick and laborious pulse; for on that account the heart acts with more rapidity, that the blood, which it thus agitates more than is usual, may be preserved from coagulating. Moreover, that this fluidity, which, from the too great expenditure of serous liquor, is brought into hazard, may be continued, the prodigious urgency of thirst causes fluid matters to be most copiously poured in, and the humidity also that was impacted with the solid parts is sucked in

again from them by the blood; nay, the very substance of them is dissolved to repair this expenditure; so that those who are afflicted with this disease are immoderately thirsty, and wither as it were away in a very short time: and thence, if I may venture to state the direct cause of Diabetes, and its true nature, I am led to think, *that the crasis of the blood, or its mixture, is so loosened, and in a manner dissolved,* that the watery particles cannot be retained by the thicker, but that quickly breaking from their connexion, and becoming impregnated with saline matters, they run out by the very patulent orifices of the kidnies: in the mean time too that the blood may be diluted and kept from coagulating, other humors, both from without and within, are seized into it, and thus, with considerable effort, the præcordia are constantly forced into a more rapid action.

" Moreover, I think that the kidnies also may sometimes concur in becoming a part of the direct cause, in as much as their ferment is occasionally wont to be so vitiated that it cannot keep the blood by the influx of the lixivial salt in its due mixture and fluidity, and for that reason the serum may be separated from it by simple percolation; but it sometimes happens that the blood undergoes a precipitation, as it passes through the kidnies, from an acid salt there deposited, producing by its coagulating quality a great quantity of serous matter, which is presently carried away through the ureters. And hence I will take occasion to observe, that in many that are liable to nephritic complaints, when the paroxysm is coming on, the urine is limpid and copious: and the reason is, that the acid humor carried there through the nervous ducts, and exciting pain, (as we have elsewhere shewn)

first of all dissolves the blood as it flows into the kidnies, and then produces the discharge of a greater quantity of serum from it.

"But it is not improbable that a copious diuresis may in some measure proceed from mal-formation of the kidnies, in as much as the tubes destined to convey the water being too large and wide receive the serous fluid too readily, and without any delay quickly transmit it, so that its greater part runs away into urine. But although I may allow that these tubes are sometimes too open, and especially in those that are subject to gravel; yet, on that account, the urine excreted should rather be bloody than in such an abundant quantity; and in truth bloody urine, I suppose, to arise especially from such a cause: further also, when the urine is both copious as well as bloody, we conclude that there is a dyscrasy of the blood, together with mal-formation of the

kidnies, as in a very striking instance I shall presently shew you.

"In the mean time we cannot doubt that the principal and most frequent cause of Diabetes consists in the too much weakened and loose mixture of the blood: and that likewise in a similar manner micturition, which is trifling and less than it ought to be, depends very often upon the texture of the blood being too close, or condensed as it were together.

"And here it may not be amiss to enquire whether a total suppression of urine may not arise from a similar cause: for, although it be well enough understood that the cause of the more violent and obstinate Ischury, which is very frequently seated beneath the kidnies, depends altogether upon the total obstruction of the urinary passages; and when I myself have opened several persons who have died with a total suppression of

urine, I have found in all of them that the invincible cause of death was an obstruction of one of the ureters, which a little while before was open, (the other having long ago been stopped up) by a stone recently wedged into it. Yet Riverius mentions two cases of compleat Ischury, which had continued several days, as cured by phlebotomy alone; and ascribes the cause of the disease to the over-distension of the emulgent veins, which therefore could not contract themselves sufficiently to expel the serum; as we observe now and then to happen in the urinary bladder, which being very full is not readily disposed to discharge its urine. But although we may believe the cases, as indeed we ought to do, yet we cannot assent to his argument: for the emulgent vessels do not perform the office which the celebrated author assigns to them: for they are not veins but arteries,

which are constantly carrying the serum along with the blood, without any hazard with respect to the urine, either from their fullness or their rigidity: but when the serum does not readily run off through the open passages, the reason seems to be that the mass of blood, being too close and compact, with difficulty lets go from its interstices the aqueous humor that is intimately mixed with it: and this is illustrated by the anatomical observations which I had an opportunity of making upon the late Bishop of Chester, who having suffered for a long time with calculous complaints, at last died from suppression of urine: every body supposed that the cause of his death was a compleat stoppage of the ureters, either with a stone or with sabulous matter; but on the minutest examination no obstruction whatever could be discovered in the ducts, nor any impediment any where to

the urine: my very learned friend, Dr. Lower, informed me of a similar case which had occurred to him, where the Ischury proved fatal, but where no traces of it whatever could be found about the urinary passages: hence we may conjecture, since the kidnies were perfectly sound, that the cause of the Ischury existed in the concreted and too compact state of the blood.

"But to return from this digression: after having explained the direct cause and the true reason of Diabetes, let us try to find out its primary or predisposing causes: and if it be asked why the *texture of the blood should become so lax and dissolved, and apt to melt into serosity*, I would answer, that the fusion of it, as of milk, proceeds from this, viz. that when in its mass salts of different kinds meet and are combined together, the remaining particles freed from the saline, by which they were separated from each

other, and kept in mixture, immediately arrange themselves under their several distinct forms. But if it be enquired further whence those salts come, by the peculiar combination of which we suppose that the mixture of the blood is loosened and kept in a state of fusion, I need not be long in pointing them out: for it is very manifest, that naturally there are always present in the mass of blood saline particles, both fixed and volatile; to which, if at any time an acid salt, or a salt in a fluid state, be added in sufficient quantity, it will easily produce the above-mentioned effect. Hence it happens, that Rhenish wine, cyder, and acid liquors, provoke a more abundant discharge of urine: moreover also, in some valetudinarians, whose blood abounds with an acid salt, medicines which contain a fixed or a volatile salt, are used to promote the urine; and not only from the fluids that

are swallowed, but from those also that are generated within the body, does that affection every now and then happen: for we may observe, that many who are liable to spasmodic diseases, before or even after the paroxysms, make a large quantity of limpid urine; of which this is certainly the cause, viz. that the dregs of the blood and nervous juice which are collected in the solid parts, if at any time they degenerate into sourness, they swell and flow back into the blood, and promote its fusion, and consequently occasion a copious discharge of urine; wherefore, since there is such a constant and habitual profusion of urine, nothing more likely can be said, than that the excrementitious humors put aside as it were into the solid parts, and thence, after having there contracted a sourness, returning into the blood, dissolve the liquor of it into too great a serosity, and consequently ex-

cite a continual and immoderate excretion. But for a principal share of this malady we may justly accuse the nervous juice; for as much as we have elsewhere shewn that this, if at any time it depart from its proper crasis, becomes very malignant and hurtful, both to the other humours and to the solid parts: wherefore, when it is in a depraved state, there is also very considerable danger that the mixture of the blood should be perverted also: but that the nervous juice is depraved we may justly conclude, since in Diabetes the animal spirits become very languid, and nutrition immediately fails altogether: and what strongly confirms this opinion is an observation which I had made in several who have at intervals been liable to this disease, that a little before the flux of urine came on, they experienced contractions and wandering pains of the nervous parts all over the body,

sometimes with listlessness and a sense of itching; sometimes with frequent spasms and agitations of the tendons, with other disturbances and disorders of the spirits: a certain sign that the liquor which bedews the nervous fibres, having become degenerate in its crasis, and filled with feculencies, is irritating the spirits and throwing them into disorder: then afterwards, when the dregs and superfluities of the nervous juice, assuming a fluidity, overflow into the mass of blood and bring on Diabetes, the aforesaid symptoms cease, but are followed by a languor of spirits and prostration of strength.

"Diabetes is commonly called a Dropsy into the Chamber-pot; and many contend that these diseases are the same, and that the causes and reasons of both are the same also; and that the symptoms only are varied in respect to the manner in which the

serous excretion is disposed of: that the blood in both cases is equally unable to retain its serum, and forced to discharge it by the arteries, but that in one it pours it out into the interstices of the body and the cavities of the viscera, and in the other deposits it abundantly in the kidnies, to be conveyed thence by the ureters. But, indeed, if you look more accurately into the matter, you will find a considerable difference between these two diseases: for Anasarca generally deduces its origin from a weak and too cold a state of the blood, whence it is not sufficiently warmed and heated to concoct and assimilate and volatilize the chyle which is continually brought to it, so as to keep it whilst they are circulating together in close combination, but is under the necessity of throwing it together with the serous humour any where out again, and of leaving it in the inter-

stitial parts of the vessels: and then, as the disease increases, the blood not only weak with its crudities, but degenerate in its crasis, becomes liable to fluxions and coagulations, and thence are generated serous humours, both in a larger quantity, and are poured with greater force upon parts not naturally calculated to receive them: on the other hand, in Diabetes the blood is sufficiently, nay is too warm and hot, and quickly and above measure concocts the chyle which is brought to it: it even melts the solid parts, and absorbs what are so melted; it carries them along with it through its vessels, and concocts them more than enough: but when upon meeting with the salts the texture of the blood is compleatly dissolved and melted into serosity, those portions which are able to get away, being separated within the kidnies, run out through the ureters. If there ever was any

disease like to Diabetes, it was one which *turned inwards;* that is, it was one where the blood, melted into serosity, poured its meltings into the whole of the body; for such was, without doubt, that fever which was formerly epidemic in England, called the *Sweating Sickness;* where the blood melting into a sort of water, poured forth into the pores of the body, even at the expence of the vital nutriment itself, every sort of humour both useful and otherwise, to be thence discharged by sweat.

"Thus far have I treated on the nature of Diabetes, and on its causes, both immediate and predisposing: and now with respect to its evident causes, or upon what occasions the acid juices, which are about to produce either the fusion or the coagulation of the blood, are generated in the human body, these are of various kinds and origin: a bad sort of diet, and principally

the constant and immoderate use of cyder, ale, or acid wines;—sometimes distress and long continued sorrow, convulsive affections also, and depressions and irregularities of the animal spirits, all these are wont to generate and to cherish this morbid disposition. I knew a man who, having used Rhenish wine for his common drink for twenty days, fell into an incurable Diabetes, of which he died in less than a month, notwithstanding he had the advice of several eminent physicians. I remember two women also who were subject to spasmodic and hypochondriacal affections, that had occasionally very large discharges of urine, with languor and wasting of flesh.

"Having now explained the theory of this disease, it remains that I should give you the reasons of its particular symptoms:—some of these I think are already sufficiently clear, from what I have above men-

tioned; as for instance, why in Diabetes the urine is so quickly and so abundantly excreted: but why the patients are feverish, and have such considerable thirst, this is the reason, partly because the humours and juices with which both the blood and the solid parts are moistened and cooled are continually exhausted by the very immoderate expenditure of them by urine; whence the fauces become parched, and the præcordia boil as it were with heat; and partly because from the urgent instinct of nature the heart and lungs are compelled into more rapid motions, that the blood, deprived of the diluting serum, may be prevented from coagulating or concreting, and be continued in its due circulation.

"But it seems more difficult to explain why the urine of Diabetic Patients should be so remarkably sweet, or be so like honey in flavor, when rather, if according to our

hypothesis, on account of the combinations of salts, there be a fusion of the blood, and that which is a consequence of it, viz. a profusion of urine, the fluid impregnated with them should certainly be rather salt than sweet: but we may obviate this objection by replying, that the urine is deprived of its saltish taste when several salts, of different kinds, are combined in it together: and this is proved by a variety of chemical experiments, that when different kinds of salts, as the fixed or the volatile, are mixed with an acid, their acrimony is blunted or lost; and therefore we need not wonder that the urine of Diabetic Patients is by no means saltish; but why it should be so wonderfully sweet, like sugar or honey, is a difficulty not easy to be explained.

"One might conjecture that such an effect arose from this cause, viz. that together

with the serum of the blood, which is running out by the kidnies, both the fresh nutritious liquor, as well as the meltings of the solid parts, flowed out also: and therefore that it was not improbable that the sweetness might be derived from these rich juices so mixed with the urine: but from such a mixture a bland and soft taste, like milk or broth, will be produced, and not a taste like honey: and moreover, to the production of this, which is not only grateful, but in a certain degree pungent also, the sharp spicula of the salts, as well as the demulcent ones of the sulphur (as I have shewn elsewhere) ought to concur. Wherefore, as sugar and honey are properly referred to salino-sulphureous concretions, so may we be allowed to suspect that Diabetic urine acquires its sweetness from certain sulphureous particles, which are picked out from the colliquation of the solid parts con-

creting with the salts that are combined with the serum.

"With respect to the Prognosis, Diabetes in its commencement is often and easily cured, but in its advanced stage very seldom and with great difficulty: for when the crasis of the blood is but a little loosened, it is brought back again into its former state without much trouble; but when it is so much dissolved, that most of its parts separate from each other, it can scarcely if ever be restored.

"But with respect to the cure, it seems very difficult to point out what may be the true purposes which we ought to aim at in curing this disease; in as much as its cause is so very obscure, and is deduced from so very deep and remote an origin: for in regard to the common opinion, that the kidnies and other solid parts, which either contain or transmit serum and blood, are in

fault in disposing of their contents too rapidly, and that therefore we must chiefly and almost wholly attack the disease with astringents, I must say, that with this opinion, as well in theory as in practice, both reason and experience are at variance; for few or none are cured by this method; and it is highly improbable, not to say impossible, that the Diuresis should proceed from such a cause. Therefore, in this affection, as in many others, there will be three primary indications of cure, viz. The Curatory, Preservatory, and Vital: the first of these which respects the disease and endeavours to restrain the too abundant Diuresis cannot be performed independently of the second indication, which striking at the root of the disease, strives to preserve and repair the just mixture or crasis of the blood: wherefore the principal intentions of the cure will be *to take care that there be*

not any fusion of the blood, and if it has in any way happened to remove it. And first, *the fusion of the blood is prevented*, provided that its thicker parts and its more watery parts contain, and are contained by each other, and that neither of them separate immediately and very hastily from the others: and this is effected by incrassant medicines, as they are commonly called, whose very viscid and glutinous particles being admitted into the mass of blood, firmly cohere with the active particles, and so separate them from one another, and prevent them from combining together, either in the fluids therein existing, or with the saline matters from some other quarter poured among them: for this purpose rice, starch, mucilaginous vegetables, gums, and some kinds of resinous matters are commonly useful in this disease. In the second place, if *the fusion of the blood has already in any*

way happened it must be removed by remedies of that kind which dissolve saline concretions, in such a manner, that all the elementary particles which are still existing in it being again set at liberty may recover their former stations, and thus reproduce in the blood its original crasis.

"I have above shewn that an effect of this sort may be produced in coagulated milk, by adding to it either a fixed, a volatile, or a nitrous salt, and by pouring upon it the spirits of hartshorn, sal-ammoniac, and the like: the reason of which, as I have in the same place hinted, is doubtless this—that whilst the saline particles, whether fixed, volatile, or nitrous, put into milk in sufficient quantity, meet with the acid or precipitating particles, and are united with them; the remaining saline particles which before were engaged, being now at liberty, and diffused through the mass of liquor,

may disunite, and every way disperse the sulphureous and earthy particles which are now combined among themselves; so that the whole of the particles being again equally mixed, may contain and be contained by each other. How much the blood, which bears a fair analogy to it, is altered by pouring distilled salts into it whilst warm, I have already shewn by experiments there related. But for the cure of Diabetes, saline medicines, as they are by most people almost always considered diuretic, are not to be carelessly or rashly resorted to, although we can in the mean time assert, that neither reason nor experience forbids their use; for I have often, in this disease, prescribed tincture of antimony with great success; and lime water, together with sassafras shavings, aniseed, raisins, and liquorice, according to the common recipe, is much esteemed by many."

The *Vital Indication* is performed by incrassating and moderately cooling diet, and by refreshing cordials, and especially by proper and seasonable hypnotic medicines—of which the principal sorts, with some select recipes, are subjoined in the next chapter. I will take my leave, however, by introducing at the end of this the case of a nobleman who was my patient at the time that I first thought of writing, and indeed whilst I was actually composing this treatise on Diabetes."

"A certain noble earl, not more dignified by the splendor of his birth than by the extraordinary qualities of his mind, of a sanguineous temperament, florid complexion, and in the very vigour of life, became inclined (we know not why) to a very abundant discharge of urine: and when thus for several months he had been accustomed at times to labour under this flux of

urine, at length he fell into a Diabetes, confirmed, as it appeared to us, and almost desperate: for, besides excreting, in the space of the twenty-four hours, almost six quarts of limpid urine, which was wonderfully sweet, and like as if honey was mixed with it, he moreover was distressed with immense thirst, fever of the hectic kind, remarkable lowness of spirits, prostration of strength, and emaciation of the whole body. At this time I was requested to meet in consultation the very celebrated physicians, Drs. Micklethwait and Witherly, and the following remedies, by which he seemed in a little while to be relieved, had been prescribed for him:

"Take of the tops of cypress eight handfuls; of the whites of eggs two pints; of cinnamon bruised half an ounce; new milk a gallon; distil them in the usual method,

taking care that they do not burn:—the dose is six ounces, three times a day.

"Take gum-arabic, and gum tragacanth, of each six drachms; of barley-sugar an ounce; make them into a powder, and take about a drachm, or a drachm and half, twice a day, in three or four ounces of distilled water.

"Take of rhubarb fifteen grains, cinnamon six grains; mix and take them in the morning, every sixth or seventh day.

"Take of cowslip-water three ounces; cinnamon-barley-water two drachms; syrup of poppies half an ounce; make them into a draught, to be taken every night."

"His diet was almost entirely of milk, which he took sometimes by itself, and sometimes diluted with distilled or barley-water, and occasionally boiled with white bread, or with barley, several times a day: upon this plan he grew better daily, and in a month

seemed almost well: As he began to improve in his health, his urine, which was insipid, did not much exceed the quantity of liquid drunk; and then becoming a little salt, was less in quantity than his drink; and then by degrees recovering his spirits, and his strength, he returned to his former diet."

"But yet the disposition to this disease did not so entirely leave him, but that frequently, from irregularities of living, and probably from changes of the weather, he was apt to relapse: and then he made water at first in great quantity, and then limpid and sweet, with thirst, and fever, and langour of spirits; but, by using the same medicines, he generally recovered in a short time."

"Not long ago, after a greater interval of health, a little before he began to perceive the flux of urine, he suffered considerable faintings, and irregularities in the nervous

system, viz. torpor and vertigo in the brain, sudden spasms in the limbs, and convulsions of the tendons, as if he felt several streams of wind suddenly running in every direction through him. Then, when by the use of proper medicines, these symptoms, which have been just mentioned, had given way—that is, when the fluid matter had overflowed from the fibres and solid parts into the blood, and thence into the kidnies and urinary passages, the Diabetes, in its usual manner, broke out again. The physicians before employed were now consulted again, who ordered nearly similar medicines to those which they had formerly directed, and in a few days he was better: it was then thought right to prescribe five or six ounces of lime-water, to be taken three times a day, which being used for four days, his urine became moderate in quantity, of a good colour, and somewhat salt;

and in other respects too he seemed nearly as well as he had ever been."

In the next chapter, after giving his opinion on the inutility of astringents in Diabetes, Willis proceeds to enumerate a variety of remedies which he adapts to the indications above-mentioned, and to the theory above delivered; but as it would be tedious, perhaps, to enumerate them, I shall only thus allude to them, not doubting but the curiosity of the reader may be tempted, at his leisure, to give them a perusal.

Contemporary with Willis was the great Sydenham, and he lived also several years after him. About the year 1680 he wrote his letter to Dr. Brady, at that time master of Gonville and Caius college, and Regius Professor of Physic in the University of Cambridge; and although, from mentioning it only in a very cursory manner, one might think that he had seen but little of Diabetes; yet brief as his account is, with

so much perspicuity does he open to us the causes of the disease, that it supplies the place of a volume: for who that reads his short description of its causes can require one more accurate, or who that considers his indications of cure can propose any more rational, or who that attends to his method of treatment can even at this hour (the wine perhaps excepted) devise a better? "It sometimes happens," says he, "although very rarely, that old men, who have previously laboured a long time under this (intermittent) disease, and have in the mean while been unskilfully managed by bleeding and purging, fall into Diabetes, even though their fever should at that time have been perfectly subdued: for when their blood, debilitated by such treatment, is rendered altogether unequal to the assimilation of the juices which are brought to it, these being yet crude and unconcocted, find a vent by the urinary passages; and

therefore, in consequence of the immense quantity of urine every time they make it excreted, the powers of the body, by degrees, are undermined, and its substance is carried off as it were by this drain. In this affection, as indeed in every kind of Diabetes, arising from whatever cause it may, the curative indication must be altogether directed towards invigorating and strengthening the blood, as well as restraining the preternatural flux of urine."

Here then follows a prescription for an Aromatic Electuary, which is bitter and astringent; and for an infusion of some warm bitters and aromatics in Canary wine.

"Let the patient," he adds, "eat food of easy digestion, such as veal, mutton, and the like, and *abstain from all sorts of fruit and garden stuff;* and at all his meals drink Spanish wine." In truth, the experience of 130 years has added so little to what

Sydenham has propounded to us in one short page, that (if when he is forbidding vegetables, he had not directed wine) I presume our knowledge on this subject would not be considered as much more compleat at the present day.

But let it be remembered, that this method of cure was adapted more especially to that Diabetes which arose in "old men, who had previously laboured a long time under an intermittent fever, and who had in the mean while been unskilfully managed by bleeding and purging;" by which means "their blood was debilitated and rendered altogether unequal to the assimilation of the juices which were brought to it." And this method, in such cases, will generally be successful: for he touches not at all upon the saccharine form of the disease, as thinking it unnecessary to detain the reader with that which every body

must then be supposed to have understood from Willis: for it is impossible to conceive any physician, much less Sydenham, to be then unacquainted with the works of Willis, the great author of the day: nor does Sydenham's silence, respecting the sweetness of Diabetic Urine, prove any thing to the contrary, since he was not writing professedly upon Diabetes; but he merely mentions it incidentally when treating upon another subject; and he might there think it useless to detail what Willis had so recently, and in such a perspicuous manner, described. Indeed he could not have omitted such a characteristic feature of Diabetes as the sweetness of the urine, which must then have been known to every practitioner, had he considered it at all proper to go more at large into the facts, which Willis just before had so fully demonstrated: and what higher compliment could possibly

be paid to Willis, than that his opinions should thus be substantially adopted by Sydenham?

From Sydenham I descend to Cullen, another bright luminary of his profession, and the founder of the celebrated School of Medicine in Scotland.

Dr. Cullen writes but shortly upon Diabetes: he fairly acknowledges, that as the proximate cause was so little known, he could not propose any rational method of cure. He mentions having hinted to Dr. Dobson, that he thought "it probable, that in most cases the proximate cause of the disease was some fault in the assimilatory powers, or in those employed in converting alimentary matters into the proper animal fluids:" but this doctrine the reader must have observed to have been known and propagated at least as early as the time of Sydenham. What Cullen describes is re-

ferable altogether to the saccharine form of the disease; for he "is not persuaded, that either in ancient or modern times, the urine in Diabetes was of another kind, although he thinks that he has met with *one* instance of Diabetes in which the urine was perfectly insipid:" and he states, (considering it as a remarkable circumstance) that it should "seem a like observation had occurred to Dr. Martin Lister;" adding, "I am persuaded, however, that such instances are very rare:" Dr. Cullen relates that he had seen twenty cases of Saccharine Diabetes.

But Dr. Heberden, who was contemporary with Cullen, seems to have investigated with more accuracy, or at least to have distinguished better concerning the nature of Diabetes. His Commentaries were not published until after his death (as he had requested); but the order of time fixes

his observations in this place. He had long retired from practice, enjoying that honourable leisure which his character and abilities, in the earlier years of his life, had most amply secured to him.

"Scarcely," says he, "have I had an opportunity of seeing twenty patients whose disease could be called Diabetes: and I may have given this name improperly even to some of them. In fevers which have proved fatal, I have more than once seen the urine perpetually as it were evacuated, and in very large quantities, with inextinguishable thirst: but this is not always so, for the discharge of urine is generally such as to induce us to reckon it altogether among chronic diseases: and it is first taken notice of when the thirst becomes greater than usual, with a dry and foul tongue, and a bad taste in the mouth: then follows loss of appetite, a hurried circulation, with a

waste of strength and flesh, and a burning skin, without the slightest perspiration; and at last of all a discharge of urine, more abundant than the drink, and of a honey-like flavour."

The venerable author here appears to me to have imbibed the opinion of Aretæus, who, speaking of the cause of Diabetes, says, "Some one of the acute diseases may have tended to the formation of this; for in their crisis maladies have been found to have left some secret evil in the habit:" an opinion consonant also to that of Sydenham, who, from long continued and badly treated intermitent fever, deduces Diabetes as a frequent effect: leaning therefore to these opinions, in the former part of his description, Dr. Heberden must rather be considered as enumerating circumstances connected with fever as the cause, than with Diabetes as the effect: for one of

these, viz. loss of appetite, scarcely ever occurs in Diabetes; and others of them seldom until the disease be compleatly formed; and therefore I am inclined to think that this accurate observer, following Aretæus and Sydenham, wished to infer, that fevers of a dangerous nature, beginning as fevers commonly do, and having regularly proceeded through their usual stages, may in the end (losing their character as fever) degenerate into chronic disease, where, " at last of all, the discharge of urine is more abundant than the drink," and where having lost its peculiar quality as urine, it acquires " a honey-like flavour."

And indeed the very learned author seems all along more especially to have had under his observation, from whatever cause or source arising, cases of Diabetes in its insipid or chronic state: for after observing, that " in health the urine is usually a fifth

part less than the fluids drunk, (an observation conformable to that made by some of the older authors) and that it often happens that for a day it is made in much smaller quantity than usual; and then again, that it is sometimes, for the same period, discharged in a superabundant quantity, and is diluted and thin, and almost altogether without colour, or taste, or smell;" he resumes his subject, and (I quote from the Latin edition) expressly says, "Every body knows that the urine in Diabetes is generally to the taste like honey; but in some who have laboured under this disease, I have seen urine which might rather be called insipid, and destitute of all flavor, in consequence of the abundance of drink with which the patients had filled themselves." He then again remarks upon the increased quantity of urine, on its degrees of inveteracy, and

upon the uncertainty of its cure; saying that it will return again after it had seemed to have ceased: and then having first doubted whether thirst may not constitute a greater part of the disease than the flux of urine from which it has taken its name, and in which its essence has been thought to reside; and stating his belief, that neither the salivary glands, nor the kidnies, were in fault, but that these two symptoms [thirst and flux of urine] arose from a disturbance of the whole frame, produced from some severe malady, different in different people, he brings the chronic nature of Diabetes again under our review, and says, "the old and the infirm are most liable to this complaint, in whom age or disease hath so worn down and impaired the strength, that death must necessarily follow in a short time, whether the patients make too much or scarcely any urine: for the disease which shall for a little

while have remained doubtful, under what shape it shall destroy the patient, may at length, from some trifling circumstance, be determined to assume the form of Diabetes, rather than that of Dropsy, or any other affection: nor in truth, even if the disease could be cured, would the patient uninterruptedly advance in convalescence." Keeping therefore this chronic form of the Diabetes continually before him, Dr. Heberden, with a sagacity so much his own, and which we can never too much admire, advises such remedies only as are calculated to remove that depraved condition of the system from which Diabetes, as an effect, is produced; calling thereby the attention of physicians to a form of disease, until his time, much unheeded, (for his contemporary Dr. Cullen says, he had seen it but once) but which is now not only known often to exist, but very often also to ad-

mit of cure, and leaving Dr. Cullen's observations in full force with respect to that other form of Diabetes, which unfortunately is but too frequently found to be irremediable.

In the year 1795, "An account of a case of Diabetes, with an examination of the appearances after death, by M. Baillie, M. D. F. R. S." &c. was published in the "Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge." This case is very valuable, inasmuch as it not only details the several opinions then more especially held upon the subject, but as every thing which the most accurate anatomical knowledge could discover is there given us. "It was written long before Dr. Rollo's valuable publication upon Diabetes appeared, in which (as Dr. Baillie states) a mode of practice has been recommended, that has been attended

with much more success than any hitherto adopted."

There is much interesting information contained in every part of the paper, more especially in the description of the kidnies; whose "veins upon the surface were much fuller of blood than usual, putting on an arborescent appearance. When the substance of both kidnies was cut into, it was observed to be every where much more crowded with blood vessels than in a natural state, so as in some parts to approach to the appearance of inflammation. Both kidnies had the same degree of firmness to the touch as when healthy; but I think were hardly so firm as kidnies usually are, the vessels of which are so much filled with blood. It is difficult to speak very accurately about nice differences in degrees of sensation, unless they can be brought into immediate comparison. A very small quan-

tity of a whitish fluid, a good deal resembling pus, was squeezed out from one or two infundibula in both kidnies, but there was no appearance of ulceration in either. Upon first tasting the fluid I thought it had some degree of sweetness, but upon a repetition I was doubtful."

I have extracted so much of the account of the dissection, in order to introduce Dr. Baillie's opinion upon the disease, with which the paper concludes,—"I should wish," says he, "to recommend it to the future observation of others, to determine how far the appearance of the kidnies, which has been described in a former part of this paper, may be constant in Diabetic Patients; and therefore, whether Diabetes may not probably depend in an important degree, although perhaps not entirely, upon a morbid action of the kidnies themselves."

Perhaps what has been said by Dr. Rollo, and by others who have written upon Diabetes, may now have induced Dr. Baillie to admit, that what he then observed respecting the kidnies might have been the effect rather than the cause of Diabetes: but nevertheless, in a disease of such obscurity, whatever so good a physician, and so accurate an observer shall have advanced at any time, and under any circumstances, even although he should himself afterwards have deserted his opinion, cannot be too maturely considered. I cannot but notice the "trial which he made of a powder, consisting of three parts of Soda Phosphorata and one of Ferrum Vitriolatum, the dose of which was a scruple every four hours, as it will be found to give some support to an opinion which, after much deliberation, I have ventured to adopt, although in the subsequent paragraphs Dr. Baillie con-

fesses that he was led to order this medicine, "not from any conjecture formed about the nature of the disease, but merely because he had heard that it had once been successfully employed in a similar case." "The plan," he says, "was continued between two and three weeks: occasionally for a day or two the urine was considerably diminished in its quantity, but it would return again to its usual standard: it was never altered in its sweetness as far as I could observe. The variety in the quantity of the urine I had no reason to believe depended upon the medicine, because the quantity varied in the trial of other medicines, some of which were not given with the view of stopping Diabetes."

I have now brought the history of Diabetes down to that period when Dr. Rollo first published his celebrated Treatise, a work which ought to be in the hands of

every practitioner who is anxious for the fullest information upon the subject.: a work which, like the discovery of sugar in Diabetic Urine, equally marks an important æra in this disease: a work which teaches us to cure what Willis taught us only to know, and which will convey his name, with that of his learned predecessor, down with honor to the latest posterity. And let not any thing which may occur in the following pages be construed to detract from that honorable distinction to which he is so justly entitled; for his observations on the absolute necessity of a pure animal diet will stand the test of experience, when speculations, with respect to medicine in this disease, by every physician who has hitherto existed, (and even those by Dr. Rollo himself) may probably be altogether neglected and forgotten: I must refer the reader to the work itself, which in its more

enlarged form is, if possible, rendered much more important by the many communications therein made from a great number of very ingenious correspondents.

I had intended to have closed my account of writers on Diabetes with the preceding short eulogy on Dr. Rollo, but it would be unpardonable in me not to mention the "Historical Sketch" by Dr. Girdlestone, of Yarmouth, who, with great ingenuity and research, has consulted very many authors, both ancient and modern, who have written upon Diabetes: I have read his work with pleasure, and I will also add with improvement.

Nor will I omit to mention the great satisfaction I have derived from reading what Dr. Bardsley, of Manchester, has given us concerning Diabetes in his "Medical Reports." His experiments on Diabetic Urine are most clear and conclusive, to

which I can refer the reader with considerable confidence and entire approbation: for the absence of *urea*, which is one of the constituent principles of healthy urine, seems to me to have been there proved beyond a possibility of doubt. And I say this with the greater pleasure, because in that very Infirmary, where the doctor is now affording his valuable assistance, I believe the very first case of Diabetes, under my more immediate care, occurred to me, when, upon my introduction into medical life, the governors of that institution were pleased to accept from me, as one of its physicians, my very imperfect services.

It is impossible (however desirous I might have been) to notice the very many detached cases which have been from time to time published upon this important disease, most of which I have read with great interest, as confirmatory of opinions which I

had long held and adopted: my thanks are due to the several authors of them, although I cannot think it necessary in this place to give an abstract of their individual sentiments.

Having, therefore, thus brought down the history of Diabetes to our own times, I shall proceed with diffidence to that portion of my work which contains my own opinions, and for which I must again crave to throw myself upon the reader's candor and indulgence: and in common with the rest of the medical world I must again acknowledge that I feel myself indebted to the laborious and minute investigation of the ingenious author, (Dr. Rollo) who again called our attention to a disease of which we had almost lost sight, and wherein we might have been said to have remained, if not inactive, at best but unfortunate and despairing practitioners. It would have been well for man-

kind, if in this, as in some diseases, the practice of physicians had not been equally as unsatisfactory as their theory; and if some better and more rational method of cure had sooner obtained, which might have been imitated with advantage, although the cause of the complaint had still been hidden in obscurity: for I am happy in stating, that whatever may be the fate of theoretical opinions, something substantial has already been derived from the practice which the above author has propounded to us, and that the fabric which may thereupon be raised will most probably be permanent, although we may hereafter find that in some degree we have been mistaken in the nature of the hypothesis on which the foundation was first laid: for in truth I know no disease which has afforded so much doubt to an enquiring mind as Diabetes: nothing like unanimity of opinion

has until within these few years been brought to bear upon the subject, for within that period many speculations have been retraced which had almost become obsolete; and various ideas have again been brought forwards which had long been neglected and forgotten: but whatever may be the issue of the several opinions, either theoretically delivered, or practically acted upon, the grand feature in the cure of the disease will always remain prominent; the matter of fact, as Dr. Rollo has described it, will always continue firmly established: I hope, therefore, I may be excused, if in delivering my sentiments upon this obscure disease I may seem to advance any thing in contradiction of statements so accurately drawn up, when I most earnestly pledge myself that the intention of these observations is merely to throw my mite into the general stock of know-

ledge upon this subject, and when I can positively declare, from the experience which I have already had in the disease, that in many of the most essential parts my own arguments bring me to very similar conclusions.

I know not whether it may be material to state, that most of the following observations have been collected from time to time, during a space of more than twenty-five years; and that whenever a Diabetic case occurred within the middle period of that time it was usually commented upon in the manner of clinical lecture, before the pupils of St. Bartholomew's Hospital, when I had the honor of belonging to that institution as one of its physicians: in no other respect, however, can it be of any importance than to shew, that originally doubting of the received opinions concerning Diabetes, I have long been in the habit

of considering the disease, and of tracing it in the earliest authors who have treated upon it, and of forming a variety of theories, with which I have been as little satisfied as with many of those imperfect speculations which have preceded me.

We owe it to the sagacity of the physician above mentioned, that we now know that any thing capable of the vinous fermentation may, when taken by a Diabetic patient, produce sugar in the discharges from the urinary bladder. We also know that abstinence from such aliment will go a great way towards effecting a cure; but we do not yet clearly understand upon what circumstances in the animal constitution, whether from defect in the digestive organs, or in the chylification, or in assimilation; whether upon any fault in one or more, or all of these several functions, the disease may more especially depend.

I suppose it may be laid down as an incontrovertible truth, that every thing containing sugar is capable of the vinous fermentation, or of some process analagous to it, in which the oxygenous principle must necessarily be more or less concerned: I will therefore assume, that all matters capable of such fermentation, in as much as they contain saccharine particles, and being from some circumstances, unknown perhaps to us, very imperfectly digested, and thence affording an incompleat and insufficient chyle, are not fully assimilated when they enter into the general circulation with the mass of blood, but have their sugar so weakly and loosely oxygenated as to be again readily evolved by the secretory action of the kidnies, not from any fault in the kidnies themselves, but from the regular and natural exercise of their function in separating from the imperfect

blood such matters as are not properly combined with it, and which, from such loose and unassimilated combination, may be considered as unsalutary to the animal machine. This loose and imperfect assimilation of chyle, derived from vegetable aliment, will render the evolution of sugar more or less easy: and if we can suppose the operation of the oxygenous principle within the body, (and I see no violence in the supposition) then we shall at once admit, that alimentary matter, however supplied, (but that which is more especially drawn from a vegetable origin) may very readily be decomposed by its subtraction: for we know that all vegetable acids out of the body losing this principle, (and they do lose it in several methods of decomposition) become easily convertible into substances, very much differing from those in their compound state; so by the sub-

traction of it, either during the assimilatory process, or in any future glandular operation, (the combination with its basis, double, triple, or quadruple, being originally weak) chyle, whether derived from vegetable aliment or otherwise, becomes reducible to nearly the primitive state in which it existed previous to its union with the oxygenous principle: and as this union in the formation of all vegetable oxyds is in general very weak, so is it consequently the more easily broken; for an original defect in the operation of the digestive powers, an irregular chylification, a fault in the assimilatory process either as the lungs may not separate something injurious from the new-made chyle, or impart something salutary to it, any or all of these causes combined may be the means of forming such imperfect blood, and of rendering it so easy to be reduced into its ori-

ginal constituent parts, that when it arrives at the kidnies (to say nothing of any changes it may experience before it gets there) its unhealthy and imperfect crasis is more immediately destroyed by its becoming perhaps a direct stimulus to those glands which in an especial manner, more than any other secretory organ of the body, unless we may except the lungs, are disposed to separate every thing that is not perfect or salubrious from the system: and it can easily be conceived that there may be this imperfect crasis of the blood, this lax cohesion of its constituent parts, in very different degrees, as is observable in dropsy, sea-scurvy, chlorosis, and several other diseases: so that not only may it exist where little of vegetable nutriment has been taken, and consequently where but little sugar can be produced, but where animal matter has alone been eaten: and that the

blood, under either of these circumstances, may therefore be so deficient in its constitution as to be too readily decomposed, or have been elaborated in such a manner as at last to have become so effete as to contain nothing in it from which the system can be nourished or supported at all.

In the theory above delivered I have endeavoured to elucidate how the imperfect and unassimilated blood may be influenced by adverting shortly to the doctrine of acidity: I presume that it may not be necessary for me, for the sake of further illustration, to enlarge upon this subject of the formation of acids, since all of them are well known to be constituted of certain bases with the oxygenous principle; and most, if not all, capable of decomposition, more or less readily, according to the greater or weaker attraction existing between their constituent elements: the chemist will

allow the facts, and the physiologist will not, I hope, consider as irrational the analogical inferences which I have deduced from them. But I may further, and perhaps more clearly exemplify what I mean by imperfect and unassimilated blood, and by the lax cohesion of its constituent parts, in the analogy which is to be observed in other chemical combinations: oil, for instance, may be united with animal mucilage, with vegetable gums, with ammonia, with potassa, with soda, and with lime —with honey, and with coarse sugar; with every one of these it may become an emulsion or milky liquor by proper trituration with pure water: the particles of oil are indeed chemically divided in all, and in appearance each mixture is very like the other; but the degree of chemical cohesion is in every one of them very different, being much more readily changed in some

than in others; and consequently in such the oil which was the basis or fundamental principle of the emulsion may the more easily be evolved or separated from its combination, and reduced into its original state again: The union of an acid too with other bodies will also very distinctly explain my meaning—thus the sulphuric acid, for example, with the several alkalis, with the earthy and with metallic substances will form crystals; but as each of these crystallised bodies holds or retains the acid with a different degree of cohesive or attractive force, the cohesion or attraction is more readily overcome in some than in others, each being resolvable into its constituent parts again: just so is it with the blood, whose fabric is made up from a variety of materials so as to appear under almost all circumstances very uniform and very homogeneous, but whose texture nevertheless

proves more or less easily destructible in proportion to the imperfect assimilation, or the laxity of cohesion among the elements which compose it.

But although I have already very much at large thus stated my sentiments respecting that peculiar condition of the blood, which disposes it to a readier decomposition into its constituent parts again, and have asserted that the kidnies, as the great conservators of the animal machine, remove from it such substances as no longer remaining in a state of healthy union, would be destructive to the system; and although I have ventured an opinion upon the probability of the oxygenous principle becoming, as I conceive, the bond of union, the *vinculum cohesionis*, which probably prevents the tendency to such decomposition among the elementary parts of it: yet, I think, there is another principle which I cannot for-

bear mentioning, with which the oxygenous also may very possibly combine to strengthen that union, and thereby more firmly to connect or bind together the texture of the circulating fluids: and here I feel that I am treading upon very tender ground, and consequently advance with diffidence; but I look to the liberality of my readers for their indulgence, and hope for their candid judgment. Whoever considers that Phosphoric Acid forms with particular substances a very great portion of all the saline matters commonly found in urine, must be very forcibly struck with the important fact of the absence, or at least the paucity, of such salts in *Diabetic* urine: Experiments must, from time to time, be successively made to ascertain the proportion of phosphoric acid wanting in the animal fluids, and particularly in the blood of those who labour under a Diabetic disease; but,

considering that such (animal) substances only, as in a more especial manner are known to yield phosphorus, have hitherto proved efficacious in checking the progress of the disease, which I shall abundantly shew, as I go along with these pages, and considering too that the destruction of parts, especially the alveolar processes, with the fangs of the teeth contained therein, (as is very common in Diabetes) may proceed from the absorbents, taking wherever they can find it that principle, (Phosphoric Acid) which may be more particularly wanted to give immediate tone and firmness to the circulating fluids; I cannot help thinking that some stress may be laid upon this opinion, and some hypothesis favorable to the present improved treatment of Diabetes founded thereon. I am not very fond of theoretical refinements in medicine, and consequently cannot draw from such any

satisfactory analogical inference; yet I think it will not be denied me, that the Phosphoric Acid may possibly possess some influence in the production of this as well as of some other diseases: for being in excess we know that it will even dissolve the phosphat of lime, and thence probably may it occasion that softness and flexibility of bone which commonly obtains in rachitis: and if I am allowed to employ the argument respecting Phosphoric Acid, from the probable excess of it in rachitis, certainly may I assume something from the defect or want of the phosphoric principle, which is so very evident in Diabetes: for if the agency of it in any one disease can be allowed, the absence of such agency may well be entertained as a probable cause in another: I know not how to press the argument in a more substantive shape further, as the truth or falsity of it must depend so

much upon future experiment; but I consider it as entitled to some consideration, assuming it as a fact not to be controverted, that animal matters, which almost exclusively yield phosphorus, prove the first effectual check to the Diabetic process; and knowing too that during the use of vegetable matters, which yield little or nothing of the phosphoric principle, the Diabetic discharge is undoubtedly increased: but whether the idea which I have formed be founded in fact or otherwise, yet, reasoning upon its probability, I have, as will be seen in a few of the concluding cases, given the Acid of Phosphorus and its compounds with some advantage.

Such then is the substance of the theory of Diabetes, which, after much consideration, and the speculations of many years, I have at last been led to adopt: but can I presume that it will be satisfactory to those

who may take the trouble of honoring these pages with a perusal, when I reflect how often I have been dissatisfied with the theories of others; how often I have myself theorised upon the subject; and how often I have again abandoned even my own opinions as futile and insufficient? Indeed I know that it will not be satisfactory, unless like myself they can discard all *single* causes as inadequate to the production of the disease, and look to its formation in the co-operation of *several* circumstances: thus, an imperfect digestion will not of itself produce it, neither will a vitiated chylification, nor an incompleat assimilation, nor even the combination of all these concurrent circumstances, unless some of the elements composing the blood may be also in such a state of lax condition, with respect to the rest, as to become easily separable by the immediate action of the kidnies: for the

blood, under the circumstances of such its unhealthy crasis, is more readily, as I conceive, acted upon by the kidnies, (whose action in Diabetes I always with Dr. Rollo must consider as sound) and its elements, being loosely connected, are again dismembered with facility, and saccharine or serous, or possibly other matters which should naturally contribute to its firm and proper crasis, are then separated by the kidnies as excrementitious: other glands, in their several secretions, elaborate from the blood matters especially necessary for the existence and continual support of the living animal, and which for the most part are soon expended in maintaining the regular economy of the system; but the function of the kidnies seems as it were confined to the separation of matters from the blood unnecessary or injurious to it, whether arising from occasional admixture, from exter-

nal causes, or from the imperfect condition of it as blood, existing in it or produced during its circulation: thus in the secretions of other glands we do not often find the peculiar taste or odour which we constantly observe in the urine of persons who have been taking turpentine, asparagus, coffee, and some other matters: for something here has been imparted to the blood, which the kidnies, as regulators and conservators of the animal machine, immediately separate again from it as noxious, but which we in vain expect to find uniformly secreted by means of any other part of the glandular system; for the *occasional* impregnations of the milk and other secreted fluids cannot be considered as militating against the general observation. In the secretory action of the skin there is indeed something analogous, or even vicarious, to the excrementitious secretion of the kidnies; and the lungs, by

their particular operation, are always separating matters from the blood which would otherwise become noxious to animal life; but for the purpose of secreting a mere excrementitious fluid, and carrying it out of the body, the kidnies must always be considered as the principal, the most direct, and most appropriate organs: and I am the more disposed to believe that no original or acquired fault attaches to the kidnies under any circumstances whatever in Diabetes, (beyond the stimulus which the unnatural and lax condition of the blood may become to them) from the consideration, that when the blood has by appropriate dietetic and medicinal means been restored to its natural state of firm combination and constitution again, the kidnies no longer secrete an improper fluid, but such as is more peculiarly their province to secrete; that which contains in it the usual

assemblage of saline matters, and which, in the true and genuine acceptation of the term, is again strictly to be denominated urine.

The reader cannot fail to have observed, that although I have considered the kidnies as the principal organs concerned in separating from the blood such saccharine or other nutritious particles, as being held in a lax or morbid state of combination with its other elements, must be deemed excrementitious with respect to it; yet, that I consider the lungs as well as the skin as performing in a certain degree, together with their more appropriate functions, this excrementitious secretion also; and that the peculiar halitus and effluvium observable in Diabetic patients, which I have above described as bearing resemblance to the faintish smell of hay, arise from particles of sugar or other nutriment, under peculiar

modifications (analogous probably to mercurial or sulphureous particles, which are seldom to be detected in similar excretions) passing off from the lungs and skin with their more ordinarily secreted fluids: I might here too, from the doctrine of excrementitious secretion in the great emunctories of the kidnies, the lungs, and the skin, be able, perhaps not unsatisfactorily, to explain some phenomena which occur in several diseases, as well as some which are connected with particular effects of medicines; but this subject I have not at present leisure to pursue, notwithstanding my inclination strongly prompts me to undertake it.

It may be curious (and to myself it is certainly very interesting) to reflect by what steps one has been led to those various ideas that have at different times been entertained upon this obscure disease: I will not di-

rectly call them *idle* lucubrations, since they have been a source of active contemplation for my mind during a very long period; but I may stile them perhaps very unprofitable, inasmuch as they have been successive exercises without correspondent benefits arising from them: and as they may bear upon the subject, although even in a remote degree, I will venture to detail some of them, that the doctrine of Diabetes, now embraced by me, may not seem to have been espoused without evincing a good deal of previous investigation; and that if the theory which I have now at last presumed to disclose should, in the opinion of the thinking and well-informed part of the medical profession, be considered as insufficient, something may be drawn even from my own discarded arguments to refute and overturn it: for I am not so anxious about the theory of the disease, with which we

shall probably never be quite satisfied, as I confess myself to be about its cure, and the prevention of its recurrence, which I trust may, from the united labours of many, be now considered as being better understood, and which may not only be attempted with greater certainty than heretofore, but often be actually realized in our practice.

I commenced my enquiries with observing, (which indeed the most superficial enquirer could not fail to observe) that for the preservation of the animal there are certain commensurate powers which balance, or counterpoise, with each other; that so long as this exact and beautiful reciprocity or conformity exists, the correspondent harmony of the machine is compleat, and its economy properly supported and maintained: the contraction and dilatation of the heart, the equilibrium of circulation between the arteries and the veins, the

counteraction of one set of muscles by another, the inspiration of air by the lungs necessarily followed by its expiration, and above all, as it seemed more especially to connect itself with this particular subject, the exact equipoise, concordance, and equability in the system of exhalant and absorbent vessels: each and all of these antagonist and contrary powers not only exist together, but they must exist in full force, for the preservation of the animal's health, otherwise it will fall into disorder, and the animal will ultimately perish. Thus, therefore, (bringing the argument nearer to my subject) if the *secretory exhalation* from a part be greater than the *secretory absorption* of that part, (for I consider both these operations as analogous or even similar to secretions) disease must be the consequence: but if, instead of such *healthy* action as we suppose ordinarily to take place in the se-

cerning extremities of the arteries, there be merely a sort of unelaborated or mechanical exhalation; if the fluids, instead of their having undergone a due separation by the powers of the system in its natural state of vigour and of health, should be simply percolated, or permitted to exsude as it were, without much or with but little alteration, from the secerning process; and if, at the same time, that this irregular or passive kind of secretory percolation supplies a larger quantity of *imperfect*, and consequently in some measure of *unnatural* fluid, than in their diminished energy the absorbents are capable of imbibing; if then such sort of secretion, as I have here described, should be effected by the kidnies, and at the same time a weakened and sluggish absorption in the urinary bladder should, as is most likely in the general diminution of animal strength, at the same

time exist, there seems to be but little difficulty in conceiving, that from the combination of two such obvious causes, Diabetes, as an effect of them, may be produced.

But let us endeavour still further to elucidate the subject by bringing the argument nearer to us, and adjusting it in another point of view: from the physiology of secretion we already know that certain fluids, being separated from the general mass of blood, possess at first considerable tenuity: that the separation of this thin fluid is performed by the peculiar contrivance and disposition of particular glandular bodies; that these glands are provided with excretory ducts, through which the separated or secreted fluids are transmitted; that these ducts either convey the fluids immediately into action as useful, or cast them out of the body as unnecessary, or that they unload them into cysts or reservoirs, where

they are either retained for the purposes of the animal economy, or, after retention for a while, are rejected from it as excrementitious: that these reservoirs, like all other parts of the body, are furnished with absorbents, which are constantly acting upon the contained fluids: we have reason to believe too, that this absorbent action is not confined to the finer and mere watery particles of the contained fluids, but extends in a more especial manner to the nutritious particles also; and that the fluids thus acted upon become, by the subtraction of their aqueous and their nutritious particles, more condensed, or to speak chemically, more *exalted:* and that in proportion to this *exaltation* such fluids are rendered more perfect, either as they are better fitted for the economy of the animal, or as they become, by such a process, more excrementitious: such then being the physio-

logy of secretion, I may probably conclude, that this weak and inactive state of the absorbent vessels of the bladder of urine, added to a passive or relaxed affection of the kidnies, may properly enough be considered as a cause of Diabetes; and even supposing this secretion from the kidnies to be equal only in quantity to that of a person in health, the absorbents of the bladder at the same time refusing to act, a true Diabetes would be the probable consequence.

Again, I think, that the quality of the discharge produced by this morbid or erroneous secretion of the kidnies, which I may perhaps have improperly termed a passive affection, if not corrected by the absorbents in the bladder, may become a direct stimulus upon the excretories of the kidnies themselves, and excite through them a more abundant discharge, in the same manner as we see that stimulants, ap-

plied to the excretories of other glands, promote a greater secretion than is natural from them: the Cholera Morbus, for instance, (I am not expected here to explain in what way it originates) seems to me to be kept up by the stimulus acting upon the extremities of the biliary ducts, which are rendered more and more irritable by bile hastily produced, and consequently imperfect, or acrimonious in quality, passing uncorrected into the intestines; for until this supposed acrimony is either so diluted, according to the former method of Sydenham, as to become less irritating; or what, in my opinion, must be more pleasant, more speedy, and equally efficacious, until (according to his later and more improved practice) the parts to which such acrimonious bile may be applied, are rendered less susceptible of its stimulus, by the proper exhibition of opium, we know that the dis-

ease will, in all probability, end in the destruction of the patient: just so do I conceive it to be with the secretion from the kidnies; which, whether passive, as above explained, and thence probably very imperfect in quality, or being profuse in quantity in consequence of the stimulus of this imperfect fluid constantly applied, whilst the absorbents of the bladder either do not act upon it or refuse to correct it, becomes that preternatural discharge which constitutes Diabetes.

What I have just now exemplified in Cholera, may perhaps be equally illustrated by the common occurrences in Diarrhœa, where the duration of diseased action is manifestly prolonged, until the acrimony occasioning it is by appropriate means removed. In Enuresis too the constant discharge provokes a constant secretion; which, wanting its proper correctives, either in time or in

place, usually terminates in atrophy and the consequent death of the patient: the relaxed condition of the organs of perspiration admits also of a similar argument, which will continue until the patient sinks into an incurable marasmus, unless either the astrictive power which may be employed, should in some measure correct the relaxation, or unless (what is more rationally to be attempted) the state of the fluids, which provoke by their acquired admixtures such preternaturally increased discharges by the skin, should be so altered as to be rendered less stimulating.

Although there be no similarity between the saliva and the urine, one being subservient to nutrition, and the other excrementitious, yet I would assert, that the flux of saliva, unless it be retained in the body for its proper purposes, will as certainly produce atrophy as a flux of urine evacuated

without the previously due separation of its nutritious particles: if the saliva was universally discharged by the mouth, instead of being generally swallowed, either digestion would, in the first instance, without its great agent, be insufficient; or, from its not being united with the bile in the duodenum, the separation of nutritious particles from the different ingesta would be incompleat, and the mass of blood, which, from its daily waste, requires daily reparation, being thence imperfectly constituted, would cease to become nutritious in supporting the constant wants of the body: hence then I would analogically infer, that an unnatural subtraction of that which is ordained as necessary to the system, whether in the secretion of saliva, as connected with digestion and the subsequent processes, or in that of urine, carrying out of the body alimentary as well as excrementitious matters, ma-

rasmus must in either case follow: and this consideration, therefore, will necessarily lead me to the question, whether in the blood, imperfectly constituted, without any fault whatever to be attributed to glandular operation, we may not look for the most obvious cause of Diabetes?

The reader will now observe, that I have been moving as it were in a circle for many years, and have vacillated from point to point without being able firmly to lay hold of any thing fixed and absolute: the true cause of Diabetes had long indeed been suspected to be at a distance from the kidnies; for Mead, with others of his time, had supposed the liver to be originally the fault: and Cullen had again taken up the idea, which had been broached at least as early as the time of Sydenham, that imperfect assimilation was the remote occasion of it; but neither one nor the other, nor indeed

any one of the earlier or of the later writers upon the disease, that I have consulted, seems to have pursued the subject beyond single circumstances, as remote and probable causes, without duly connecting such circumstances with that necessary excrementitious secretion, which is the natural, constant, and healthy action of the kidnies: that the primary cause of Diabetes is owing to a want of vigour in the digestive, or chylifying or assimilatory powers of the system, or perhaps to a debility in *all* of them; and consequently to an imperfect state of the fluid so prepared, I think it therefore very reasonable, with others that have preceded me, to conclude: but although I will not presume to deny, that the glands of the skin in particular, and that the salivary and mammary glands, or any other glands of the body, may occasionally separate, with their more appropriate fluids, some-

thing from the mass of blood which may unnaturally exist in it, (since the blood is applied to every gland perhaps under very similar circumstances) yet as the office of the kidnies is manifestly to perform an excrementitious secretion, and the blood is, from some primary cause or causes, improperly or unnaturally constituted, there is no reason to suspect in them any morbid action, but on the contrary to conclude, that Diabetes ultimately arises from the natural and healthy action of the kidnies upon unnatural and imperfect matter, which it is their function, more than any other glands of the body, to remove as insalubrious, and as destructive of the animal machine: and that the quantity of this fluid, so secreted from its unusual stimulus, provokes still more and more that excessive and continual discharge, which constitutes Diabetes.

It was my original intention, in this part of the work, to have delivered the opinions of those who have written on Diabetes, extracted from the earliest records down in a manner to our own times; but this the reader will observe to have been done at the commencement of these pages. Perhaps it might have been thought more expedient, and more in their natural order, that I should have inserted them here; but I was unwilling to separate the ideas which I have formed upon this disease from the facts which produced them, and therefore I shall now hasten to mention some of the more prominent cases which have from time to time passed under my consideration: but although opportunities of observing this disease have been very frequently afforded me, as will be evident from the cases I am going to relate, yet I fear that I shall become liable to the imputation of either

having been very ignorant, or very inattentive, in having drawn such little profit from such very abundant experience: I may, however, be allowed to hope that some observations may occur in the detail not quite unimportant; and whatever remarks I may take occasion to make, that their insignificance may find some apology in the obscurity of the disease on which they are offered.

The first case which I remember to have seen was in the Radcliffe infirmary at Oxford, under the care of the late Dr. Parsons, then Clinical Lecturer in the University: the impression of its being an incurable disease, which the medical pupils received from the professor, was sufficiently fixed in their minds by the inefficacy of the remedies which were from time to time prescribed for the patient's relief: worn out with expectation, and despairing at last of

receiving any benefit, he was at his own desire put upon the list of out-patients, and requested to come occasionally to the infirmary, that the pupils might have the opportunity of seeing the progress of the disease rather than with any expectation of a prosperous issue to the complaint: a few weeks elapsed before he returned to us, and to the great astonishment of all we found him improved, not only in his appearance, but also very materially in the urinary discharges. His own account was, that weary of life, and destitute of every ray of hope, he had wandered about as well as his strength would allow him for a few days amongst his fellow-labourers of the neighbourhood, and finding from this exertion that his strength did not decrease, he was tempted to take a part in the work that was going forwards; that a copious perspiration very soon ensued, under which he

did not feel himself weakened in bodily powers, but rather improved in spirits; that he renewed the same sort of easy occupation from day to day, with the same comfortable event; and that at last not only his spirits but his bodily strength was manifestly increased: his urine, however, was then neither perfectly natural in smell, or taste, or quantity, although in all these respects it was certainly much amended: he visited the infirmary a few times afterwards, at irregular intervals, and at last ceasing to attend altogether, we concluded from the progress made towards recovery, whilst he continued his attendance, that he probably had been fortunate in experiencing a cure: and had we been *then* as convinced of the efficacy of animal food in Diabetes as we now are, we should probably have thought that the provincial diet of that district might possibly have con-

tributed to his relief, for the poorer sort of labourers usually lived upon a large onion, with fat bacon, and no great portion of bread.

I recollect two or three cases which occurred during my attendance at St. Bartholomew's hospital, as a medical pupil, from the year 1782 to the year 1784; and another case, which was under my own care, in one of the two subsequent years, while I was physician to the Manchester infirmary: but there was nothing in any of them uncommon: the same vague and uncertain means were employed in their treatment, and they all terminated fatally. There occurred also another case of Diabetes in the Radcliffe infirmary, upon my removal to Oxford, not under my own immediate care, but under that of one of the other physicians to that institution: how it terminated I cannot exactly state, as I soon afterwards

settled as a practitioner in London; but from its progress whilst I had the opportunity of observing it I should suspect it to have ended unfavorably.

About the year 1789 there was a most remarkable case of Diabetes in St. Bartholomew's hospital, under the immediate care of the late greatly to be lamented Dr. David Pitcairn: the patient's history of himself was this: that a rat had bitten him between the finger and thumb, that his arm had swelled violently, and that boils and abscesses had formed not only in that arm but in other parts of the body: that his health from that time had decayed, and emaciation followed. His urine had then the true Diabetic character, both in quantity and quality: the saccharine part was in very great proportion indeed, constantly oozing through the common earthen pot over the glazing, and affording an infinity of pure

saccharine crystals adhering like hoar-frost to the outside of the utensil, and which were collected by myself and by every medical pupil daily, in great abundance. The saccharine particles of this man's urine were manifestly much increased by feeding him with considerable quantities of sugar; but it did not appear that the serum of the blood was sweet, notwithstanding it was supposed by some to be in appearance more turbid than natural: after a variety of medicines were tried with this patient, and every means employed to detain him in the hospital, he left us certainly not advanced in his cure: I pass over two or three cases which were admitted about this time into the hospital, because there was nothing in them very particular; because there was the same uncertainty in the medical treatment of them; and because the same unsettled dispositions on the part of the pa-

tients rendered their stay with us very short and unsatisfactory.

In the year 1793 I was elected physician to St. Bartholomew's hospital, and soon afterwards had a Diabetic patient under my care, who voided five, six, and seven quarts of water every twenty-four hours. It was the first female case that had occurred to me, and I had the satisfaction of finding that she was in a short time much relieved; for the urine soon decreased in quantity, and acquired again its regular colour and alkaline smell, and no sugar could be perceived either by the taste or ascertained by evaporation: she then left the hospital, and returned to her service; but her weak state of health did not permit her to continue in it, and she went to her friends at Marlow: here her Diabetes again recurred, and she a second time applied to me at the hospital; where having

remained a while, and as she thought experienced some benefit, she was anxious again to go down to her friends, notwithstanding her strength was not by any means sufficiently re-established for me to discharge her from the books satisfactorily to my own feelings.

Nearly at this time I had seen in my private practice a gentleman who had returned from Bristol Wells, where he had been trying those waters under the care of his physician: the usual symptoms of Diabetes were here very urgent, his urine was in very large quantity, and the restless and impatient disposition very highly characterised: it was singular in this gentleman's case, (but which I have since several times observed) that he could never allow himself to think it to be Diabetes, although he might, at any moment, have satisfied him-

self by the taste that it was so: he was continually deceiving himself in making distinctions about the frequency and urgency of micturition, and constantly overlooking the enormous quantity of water which was perpetually flowing from him: in the last weeks of this patient's life I had the assistance of Dr. Warren, who attended in conjunction with me, as long as he had sufficient strength to come occasionally to us from Blackheath: but his debility increased so much as soon to render it impossible for him to reach London, and in a week or ten days afterwards he died suddenly: in this case, as is common, the urine for a few weeks had been very much diminished in quantity, and the appetite and thirst had become very moderate; but debility increasing, and the functions of the system being consequently almost destroyed, he

sunk under the load of his infirmities, attended at last with the additional misery of anasarcous extremities.

About two years afterwards there was a case admitted into the hospital with every symptom of Diabetes, such as great thirst, considerable appetite, emaciation, versatility of mind, and large quantities of pale urine; but there was not any sweetness, nor that peculiar odour which is usually to be perceived in the discharges of Diabetic patients: upon exposing the water to heat, for the purpose of evaporating it, a coagulum formed in a short time, or I should rather say, that it appeared exactly like the serum of the blood when exposed to the same degree of heat: he soon left the hospital, and became an out-patient; but being unwilling to attend for his medicines, he was diligently supplied with them (with my concurrence) by two of the medical pupils,

to the time of his death, which happened in about six weeks afterwards.

I know not whether I am quite correct in point of time, but in arrangement I think it best in this place to state the case of a gentleman who had attained the age of sixty-three, and who had frequently been under the care of my fellow-student and friend, the late Dr. Austin, for a dyspeptic complaint, and for an hœmorrhoidal affection, which, although he generally conceived to be salutary to him, was sometimes so troublesome as to require the assistance of physic. During the frequent visits which I made him, both in London and at his house at Westbourne, (for I attended him at intervals, for a year or more, to the time of his death) I always found his urine exactly of the Diabetic color, and usually very perceptibly sweet; and on my being observed one day dipping my finger into it,

for the purpose of tasting it, he pleasantly remarked, that his school-fellows were accustomed to laugh at him for making white water, and that it had always had that wheyish appearance as long as he could remember. A similar case of chronic Diabetes was about this time mentioned to me by the physician who attended him, as it occurred in the clergyman belonging to one of the royal hospitals, (a gentleman well known at that period to almost every one of us) in whose urine saccharine matter was discoverable, and which possibly might have existed for many years unknown to the patient, who at last died of the joint effects of age and infirmity. I will not detail two or three other cases, which, although but marked slightly with the pathognomonic symptom of sweet water, were nevertheless strictly Diabetic: in these there was a very considerable dyspeptic affection, for

the patients were much addicted to the use of spirituous liquors, and they might, with equal propriety perhaps, have been said to have died of that sort of atrophy which such excesses too frequently induce, as to have fallen martyrs to the Diabetes.

At the latter end of the year 1795 I was consulted by a person belonging to one of the great retail houses in Holborn, and whose account to me of his case, after his recovery, was stated to me by letter in nearly the following terms:—"I laboured under a dreadful pain at my chest for eighteen or twenty months, and could get but little rest at nights: I was at times worn out with pain: my inside was much inflamed, and I have been obliged to get up to make water six or eight times in a night: my water was at times of a pale colour, and rather sweet: I had a sighing and lowness of spirits: I was ordered to

sea-bathing, which made my pain much worse—then the warm-bath, but to no purpose." I find, by a memorandum on the back of this letter, that on November 8, 1795, I directed for him three large spoonfuls of an infusion of Cascarilla, with oxymel of squills and compound tincture of cardamoms, to be taken three times a-day —from which he received no benefit; and that on the 20th of the following month I ordered him a tea-spoonful of equal quantities of the compound spirit of ammonia, and camphorated tincture of opium, to be taken occasionally in a glass of water, whenever he was distressed with a pain at his stomach, and a single grain of calomel every night: the chemist will at once discover that a decomposition would necessarily occur in the mixture of the two spirits; but as my patient found himself better, I did not think it material to cor-

rect the chemical error, supposing it possible that the Benzoat of Ammonia, might have something to do in his relief: be this however as it may, he considerably improved in health, and with the assistance of some tonic, (which I really now forget) afterwards continued to do very well.

The next case was that of a gentleman well known in the profession of the law, which was remarkable in its progress, although unfortunately not so in its event: for it was equally as unhappy in the issue as any that had preceded it, notwithstanding it had the full benefit of Dr. Rollo's plan, which just at that time was published, and was becoming universally known to the medical world. This gentleman was a married man, and had a large family of very fine children: he had occasionally consulted me for a dyspeptic complaint, which usually had given way to the com-

mon remedies: I never understood him to be deviating from the strict line of temperance, but on the contrary always found him anxious to return to his residence in the country, where he preferred the quiet of domestic society to the company of any of his friends at his house in town: he was tall and thin, and about forty years of age; inclined to be thoughtful, and of a melancholic temperament—not loquacious or obtrusive in conversation, though well informed. The several excretions were always uniformly regular; he had no thirst, nor any preternatural appetite for food, and he slept generally very well: he complained of flatulent and acid eructations, which, with a soreness of his legs, occasioned by very frequent cramps, and accompanied, as he thought, with an increasing debility, constituted his ailments: he so uniformly insisted upon the natural quantity as well

as quality of his urine, that although he had called upon me from time to time I never thought it material to examine it; and being assured that he seldom voided more than a quart in twenty-four hours, I believe I was at last desirous of an opportunity of examining it, more with a wish to satisfy my mind respecting any bilious impregnation, than under any suspicion that the disease might be Diabetes: for I had more than once mentioned the circumstances to his friend, the late Mr. Minors, who had indeed introduced me to his acquaintance, and neither of us could reconcile the absence of thirst, and a very moderate appetite, with any thing that we had ever before seen of the disease. I thought, from his general appearance, and from a minute examination also, that the liver was not unsound; and as there was neither diarrhœa, nor colliquative perspirations, I

suspected either that an unhealthy state of the lacteals and mesenteric glands was the cause of the complaint, or that the nutriment of the system must be discharged by the urinary passages: on this visit to me therefore I did not then prescribe for him; but anxious to be satisfied about the quality of his urine, I requested permission to wait upon him the next day for that purpose: he had then made his usual quantity of water, something less than a quart since I had seen him, which was of a deep straw-colour, but so excessively sweet, and so free from any unpleasant odour, that it might easily have been mistaken for thin syrup: I took away with me an half pint bottle of it, and upon evaporation it yielded in good sugar at least a sixth part of the whole: several experiments gave us the same result, for it was repeatedly evaporated in the chemical laboratory of St. Bar-

tholomew's hospital. I really cannot accuse myself of any inattention, even to the minutest circumstance of this gentleman's case, for he had great confidence in me, and had often therefore consulted me; and on my part I considered him not more my patient than my friend: the method recommended by Dr. Rollo I urged to the fullest extent; the medicinal part of the plan was carried much farther than is directed in that publication; and the animal diet, with forbearance from all fermented and vegetable matters, very strongly insisted upon: all seemed, however, to be done to no good purpose, except that I occasionally fancied that there was less saccharine matter in the water when I now and then tasted it, but which opinion the examination by evaporation seldom justified. After going on in this manner during several weeks, he came suddenly to Lon-

don, for hitherto he had generally resided in the country, coming to town every week, only for a day or two, when the business of his court rendered it necessary: his urinary discharge was pretty much the same; but he had now a troublesome cough, with considerable tightness across the chest, a hot and dry skin, and a quick pulse; and in short there was so much of inflammatory action present, that I was almost tempted to take away blood: but considering his very debilitated state—considering also the fatigue he had undergone in his journey, and supposing that I could direct it to be done in the morning, should symptoms then justify it, I ordered him to be put to bed, and a cup of very weak white-wine whey to be given him, with a small portion of spirit of hartshorn; and I moreover directed a dose of the volatile saline mixture, with antimonial wine and opium, and forbad him

all animal matters whatever: thus, therefore, I lost the opportunity of knowing whether any uncombined sugar existed in the blood, for early the next day I found all his symptoms moderated: he had sweat profusely, his breath was free, and his pulse natural; but to my very great surprize his water had a strong terebinthinate smell, was very small in quantity, was higher in colour than usual, and had not the least discoverable sweetness: I know not whether the smell of the urine might not have been influenced by the painting of the house, which was then unluckily going forwards; but not trusting to my sense of taste, as it might have been altered by the turpentine odour, I ordered the water to be evaporated, and found not a particle of sugar: there was a ropy sort of gelatinous matter, and little or nothing of any urinous salts; of course, therefore, although the

water had ceased to be sweet, yet it had not become urine—it was still an unnatural discharge.

The painting of the house made it impossible for my patient to remain in it, and he therefore accepted the invitation of a friend to take his house in the city during the time that his own could not comfortably be occupied. At the house of this kind friend I then visited him, and found in a few days his water to become again very perceptibly sweet: from day to day, during three weeks, it varied, being sometimes sweet, and at other times having a nauseous bitterish taste, yielding on evaporation, either sugar mixed with mucilaginous matter, or a ropy mucilage without any saccharine taste whatever: henceforwards it assumed an uniform appearance, was as usual little in quantity, being at no time ever so much as a quart in the day and

night—and in colour, smell, and taste, it became absolutely urinous. His strength, however, did not increase; his thirst was perhaps less than natural; and his appetite continued to be now as it had before been, sometimes good, but never great: his memory had all along been very imperfect, and his recollection of the most common occurrences was latterly so bad, that he had not, as he expressed it, any head to cast up the most trifling arithmetical account. Being removed to his own house, he was directed to take a draught of myrrh and steel three times a-day, and during six or eight weeks he thought himself better, and in truth he actually appeared so to me: but hectic symptoms afterwards became very urgent; a viscid state of the fauces, and short cough, began much to oppress him; colliquative sweats gradually wasted his weakened frame, and in the end, after two

or three days of great impatience, restlessness, and anxiety, his lingering spirit at last slowly departed from his cold emaciated body, in the year one thousand seven hundred and ninety-seven.

As I wish only in this part of the work to enumerate facts, with the intention of applying them in support of any arguments which I may in the conclusion employ for maintaining any particular opinions, I will not here anticipate any thing that I may then judge right to advance concerning the method of cure; let me however just observe, that during the former period of this gentleman's disease, I enjoined him a strict animal diet, with as much milk as he chose; but in the latter part of it he eat and drank almost as his fancy directed him, since it was found that none of the vegetable decoctions had for several weeks affected his urine, nor any sweetness again arisen from

the use of vegetable matters, or from fermented or vinous liquors.

At the same time that I was in attendance upon the last patient, a neighbour of a friend of mine at Finchley was desired to call upon me: his thirst was great, his appetite very good, his saliva frothy and white, his restless disposition very great, and his emaciation excessive: as he kept an inn I gave him credit for taking all or any kind of liquors; and I found, that notwithstanding any such indulgencies, he had, as long as his strength permitted him, diligently and laboriously applied himself to his business: his disease was perhaps as strongly marked as any I had ever seen, and yet I must confess that I did not immediately discover it to be Diabetes: for either from his too visible habits of intemperance, or from his manner of explaining himself, or from some other circumstance,

which for the moment tended to conceal his real situation from me, I was led far away from his disease; and although it may appear very strange to assert it, yet a very peculiar odour issuing from his person, and which I then for the first time perceived in this disease, (an odour which I have admitted into my description of it as a strong character of the Diabetes, and which I know not how to express, otherwise than by describing it as faint or hay-like, or similar to that arising from half-withered flowers in a confined place) so forcibly struck me, on his being about to leave my room, as to induce me to call him back again, and although I had written my prescription, to renew my examination of his symptoms: I then found out the true nature of his complaint, and that he was making a large quantity of pale water, which, upon almost immediate examina-

tion, after voiding it, was very sweet, and yielded, on subsequent evaporation, about a tenth of its weight of sugar. This patient died in six or seven weeks after his first visit to me: I directed the plan of strict animal diet, with the other means of relief recommended in Dr. Rollo's treatise; and I was anxious to have taken him under my care into St. Bartholomew's hospital: but in this I could not prevail, neither can I answer for his adherence to the plan proposed to him, though for three or four weeks he visited the hospital as an out-patient: under such circumstances it was impossible to observe much, yet I learned from his friends, in the last few days of his life, and what indeed I believe to be generally the case, that when his emaciation became extreme, that his thirst and appetite proportionally diminished, and the urine (the quality of which was not men-

tioned) very considerably abated in its quantity.

The next was the case of a gentleman with whom I was afterwards upon terms of very friendly intercourse, and whose urine yielded sugar upon evaporation, in the proportion of one ounce in sixteen or twenty. A common attack of fever first made me acquainted with him, and which, with some difficulty, gave way to the usual methods of cure: his recovery I found retarded by a frequency of micturition, which interrupted his sleep, and which had very long distressed him: he attributed it, however, to some disease either of the bladder or of the prostate gland, which he said he knew to exist, for that his water was often loaded with large quantities of mucus, and that he had been in the habit of introducing bougies for several years, to overcome a stricture which he always found seated very

high in the urethra. As he recovered his strength, and was again able to pursue his professional concerns, I did not then at all suspect that there might be any additional cause of his frequent calls to void his urine: nor in truth did I ever suppose, during two or three attendances which I had afterwards upon this gentleman, that any thing more than irritation at the neck of the bladder, increased by a little occasional intemperance, was the cause of the hectic which usually attacked him, accompanied by its common symptoms of thirst, and heat of body, and costiveness. It was nearly two years afterwards, when, from a continuance of these symptoms beyond their usual period, I first suspected that something Diabetic might be connected with them; and on examining the urine I found it sweet. As he was a man of a sound understanding, I explained to him

such circumstances as might best induce him to persevere strictly in a proper plan of diet and of medicine; and although he had been accustomed, from a public situation which he held, to live well, I found no difficulty in shewing him the necessity of avoiding all vinous and spirituous liquors, and of entering upon a plan of compleat abstinence from all vegetable matters. He took freely and largely of milk, both night and day, to which he latterly added mutton-suet; and his more substantial meals consisted of animal food, with a very small quantity of bread. He took the sulphurated hydrogenous medicines, in very large doses, without any manifest advantage: and afterwards, for many weeks, persevered in the common green mixture of sulphat of iron, with myrrh and tartrat of potash, in the quantity of half a pint in every twenty-four hours, which I was induced to press

upon him from the benefit I supposed to have arisen from its use in a case above related: this gentleman's strength very much increased under this plan, which, from the relief obtained, he pursued with astonishing perseverance: his urine became much less troublesome, having sometimes but very little sugar, and occasionally none at all: the organic mischief at the neck of the bladder, of course, still continued, and his nights were still disturbed, by his being frequently obliged to make water, but he recovered his usual countenance and his strength again. He did not afterwards indulge to any immoderate extent in company, but as to food, took his milk and suet during some years, pursuing to the time of his death, in 1803, a very active employment, and undergoing great exercise, both of body and mind.

Hitherto I have detailed the cases that

have occurred to me, more at length, perhaps, than might be necessary; but if any apology may be required for it, I have only to observe, that what I have stated is almost literally written from notes which were taken when the cases were passing under my observation: and the same apology must be offered for any imperfect statement, if such it should appear, in those which follow; for having made up my mind with respect to the method of treatment, from finding it in several instances successful, I was not so studious about noting all the particulars of any individual case, as I had been accustomed to be: but the truth of the matter is, that besides those which have been already, and those which are about to be mentioned, many others did occur, of which I took no note whatever, either because they yielded (although the symptoms were really Diabetic) in so short a time,

that I had not a convenient opportunity of ascertaining the sweetness of the urine; or because, from the very common versatility of mind attending this disease, the patients did not return to me after the first interview: of these, therefore, as cases merely of conjecture or suspicion, I have not made any record; considering those only as truly legitimate, whose names, with other circumstances, impossible from their notoriety to be misunderstood, I could fairly and honestly register.

The memoranda relative to the next case I find to have been made in pencil, upon a letter written to me by the patient's brother, in which I am "requested to call upon him any time that morning in one of the streets leading into Bedford square: he has not been well (says he) some time, and in addition to his old complaints, he has had great weakness in retaining his water, and

which, within this week or two, comes from him when asleep: I fear his complaints are so connected and complicated, that there is little chance of their being entirely removed; but still we hope you may relieve him in part, or prevent their increasing: you know the *irritable* state of his mind, and I have no doubt your kind attention and medical advice will be of great service to him." In transcribing the pencil marks, the circumstances of connection and complication, above alluded to, will be sufficiently understood—for I have there, with an interrogation, written "Diabetes Senilis? Thirst—appetite moderate—water in greater quantity—not quite urinous—limpid—sometimes sweetish—frothy—in those subject to complaints of prostate and urethra." Here my account ends, but it brings at once to my recollection, short as it is, that I *then* thought the

diseases of the prostate and urethra, with which he had for a long series of years been afflicted, might have some share in producing the Diabetic complaint, as *at that time* I supposed such to have been the predisposing cause in the gentleman's case last mentioned. Some relief was obtained, as long as the patient would strictly conform to diet and medicine, and the sugar for a time was not to be found in his urine: but the enuresis of course continued, and his other complaints were so troublesome, and so distressing, that it was in vain to expect permanent advantage from any plan whatever; and indeed his irritable and fretful state of mind rendered it absolutely impossible for any thing to be attempted for him, with even a rational expectation of temporary benefit.

On September 30, 1799, a gentleman from Cambridge consulted me, who had

been under the care of the Regius Professor of Physic: he made six quarts of sweet water every twenty-four hours: his saliva was frothy and clammy, and he was much emaciated: I ordered him the myrrh draught, with sulphat of iron, and enjoined him a strict animal diet. He returned to the university, and I heard from him no more.

About this time a gentleman of Gray's Inn consulted me, who made four or five quarts of sweet water, and I ordered him exactly the same diet and medicine as directed in the last case: his avocations compelled him to go down to Oxford, and I wrote to the Clinical Professor upon his complaint, who, in a very judicious letter, dated "Oxford, Nov. 3, 1799," writes to me as follows:—

"I was much obliged by the letter you sent me by Mr. ——: his return enables me to express my obligation; I wish I could

at the same time give you any account of his improvement. He is certainly a little better in the circumstances of his general health: his countenance is improved, his appetite better, his thirst less, and his body less costive; but the urine is nearly the same, I believe, in quantity, certainly in quality, being sweet and colourless. He complains also very much of weakness; I endeavoured, when he applied to me, to prescribe a medicine for him, which, by rendering the bowels regular, should preclude the necessity of employing vegetables largely to attain that point: this I effected by the following formulæ:—℞ Kali ℈j. Ferri vitriolat. gr. xxxij. Tere et adde G. Myrrhæ ʒij. vel q. s. ut ft. Pil: xxxij. Sum. Pil. ij vel iij mane et vespere.—℞. decoct. Cinchonæ ℥vii Pulv. ejusd. ʒiss. Spir. Lavend. comp. ʒj. Tinct. Sennæ ʒvj. M. Sum. cochl. iv. larg. mane hor undecimâ, vesperi horâ quintâ quotidie.

"I have had no experience myself of the Hepatised Ammonia, nor did I know whether it could be procured here or not; and as the gentleman's stay was likely to be so short in Oxfordshire, I was not very anxious about it: but as I have seen the best effects by limiting the use of vegetables, and if possible preventing it entirely, I urged this point as much as I could, but I am afraid I was but imperfectly obeyed. Indeed, I fear we shall have but very few patients who will so perfectly comply with that part of Dr. Rollo's plan, as the patient he has described. Much light has certainly of late been thrown upon this very obscure disorder: while it was considered primarily as a disease of the kidney, every writer on the subject rivalled his predecessor in error: Dr. Mead, I think, first led the way to the conjecture, that the first cause of the disorder had its seat in the organs immediately

subservient to digestion; though he, perhaps erroneously, arranged it as a disease of the liver. What the particular state of the primæ viæ is, which disposes them to favour the extraction of sugar from the food, it is very difficult to say, but I think it strongly connected with that state which predisposes to acescency, and therefore I apprehend alkaline and alkalescent medicines, combined with tonics, are most likely, in concurrence with a diet of the same nature, to prevent the progress and effect the removal of this disorder: but as the fixed alkalies have a well known operation on the kidnies, I conceive these are not so proper as the volatile alkali, and the calcareous absorbents;—such as Pulv. Test. Ostr.—Magnesia—Aqua Calcis simplex et composita—and preparations of Cortex Cinchonæ with Aqua Calcis. I have thought sometimes that I have found great advantage from the

use of vitriolated zinc: but it is of material consequence, if possible, to excite and keep up the functions of the skin; and here again perhaps, the ammonia, whether simple or hepatised, may have superior virtue by promoting the discharge of the skin. I once had a diabetic patient, who, while he employed vitriolated zinc and aqua calcis, was going on towards recovery: he had strength to labour, and his labour kept up a free and equable perspiration; but happening to wound his hand, he was laid up, his skin became dry like parchment, his thirst and internal heat increased, and the diabetic symptoms were aggravated: he was an out-patient of the infirmary, and how long he lived I never heard. One peculiar difficulty Mr. —— finds, which must be attended to: his thirst is at times very distressing: if he is condemned to an abstinence from liquors, he thinks it very

hard that he may not be allowed an apple or a pear to quench his thirst: this I have contended against strenuously. I should think a little bit of the fruit lozenges, damson cheese, or something of that kind held in the mouth, might be permitted occasionally. These are all the observations," &c.

This patient was much relieved; for although I have no minutes of his case beyond those already stated, I find his name among those of other diabetic patients, with "April 2, 1802, Gray's Inn," annexed to it.

Of the propriety of restoring to the skin, as just hinted by Dr. Wall, which in Diabetes is usually dry and harsh, the full exercise of its proper functions, there cannot be the least doubt; and if we consider, that in many cases of general disease, where the urinary discharges are deficient those by perspiration become as it were vicarious, the attempts that have been made, and are

still recommended by physicians, to excite a diaphoresis, must be peculiarly proper: as I have before stated, these together, with that of the lungs, are the great operations by which excrementitious matters are thrown out from the blood; and should the kidnies be acting inordinately, we can readily see that the restoration of that regular distribution to the skin, which is so essential to the health of the system, if it may not altogether be relied upon for the cure of Diabetes, yet that it is at all times desireable. And here, although in point of time the history of the case may be irregular, I cannot deny myself the satisfaction of inserting the substance of a letter, dated "Oxford, Jan. 7, 1810," highly illustrative of the advantages to be derived from such a practice, with which I have been favored by Dr. Kidd, the chemical professor in that university, in which he says,—"Dr. Wall

having encouraged me to hope you will excuse the present liberty, which indeed is taken at his suggestion, I with pleasure communicate to you a fact which fell under my observation last winter, in the case of a Diabetic Patient, then under my care in the Radcliffe infirmary. He had been ill two years when I first saw him, which was on the 5th of November, 1808. In the first instance I tried the Ammonia Hepatisata, and the Pilulæ Ferri cum Myrrha; which plan was continued till December the 3d, when I adopted the following:— Pulv. Ipec. comp. gr. vj cum Antim. Tart. gr. $\frac{1}{8}$ sextâ quâque horâ. Gambog. gr. iij cum Tart. Cryst. alternis auroris. Dec. 10, Perst. in usu Gambog. cum Tart. Cryst. alternis auroris: Capiat Pulv. Ipec. comp. gr. xij cum Antim. Tart. gr. $\frac{1}{4}$ sextâ quâq. horâ. The apparent effect of the foregoing plan, which was persisted in nearly three weeks,

was a very considerable diminution in the daily quantity of his urine, with a slight renewal of the insensible perspiration of the skin. His bowels, in the mean time, were not farther acted on by the gamboge and tartar than to produce one natural stool daily. The patient himself was so sensible of relief, that he determined to return to his home, some miles distant from Oxford; but having waited in expectation of a conveyance, during two or three hours in the open air, or scarcely protected from it, the weather being cold and snowy, a febrile attack was the consequence: this terminated in typhus, of which he died. It is worth observing, that the above-mentioned plan having been set aside upon the accession of fever, the Diabetic symptoms returned. With respect to the diet of the patient, it being my wish to see the simple effect of the medicines I prescribed, no particular

directions were given, and I presume, therefore, it did not differ from that of the generality of the patients in the infirmary."

The imperfect condition of my notes will here permit me only to record some cases as Diabetic, without being able satisfactorily to explain their progress as connected with the method of treatment: one was that of an elderly man, clerk to a gentleman in the Temple, who had laboured under great debility for several years, and whose life, after the disease was discovered, was manifestly rendered more comfortable for many months afterwards by the steel pill with myrrh, and the aloetic pill with steel occasionally: his urine was very sweet, but it varied in proportion as he conformed himself to his dietetic and medicinal regimen: another is mentioned as a case of Diabetes, with the age 63 annexed, and with the observation, that four years ago

he had suppression of urine, which required the use of the catheter: and a third is that of the father of a person well known a few years ago, as having practised the most ingenious deception upon the literary public, by a pretended discovery of manuscripts. This gentleman's water was very sweet indeed, and, from an account of it which remains with me, in his own hand writing, for three successive weeks, varied from eleven pints, when I first saw him, down to four pints, in the twenty-four hours; but six pints were the usual quantity, and might be considered as the average, when he ceased to observe it any longer. The method of strict abstinence from vegetable diet, with such alterations in his medicinal plan as circumstances pointed out, did as much as I believe was possible to be done in his worn and emaciated constitution: but his spirits were gone, and his heart broken; for

notwithstanding the world did not give him credit for his assertions respecting his concurrence, or even connivance, at his son's literary fraud; yet I have the strongest testimony (and in justice to his memory I think myself here called upon, since I have this opportunity, to record it as his death-bed declaration) that he was totally ignorant of the deceit, and was equally a believer in the authenticity of the manuscripts as those which were even the most credulous.

I was about this period consulted for a young lady, brought to me from Deptford, by a very respectable practitioner of that place, and whose case is, if I mistake not, related by his son in an inaugural dissertation: the little I saw of it I consider as well worth recording, from the circumstance of milk diet (which I have never seen in any case, either before or since) ren-

dering the urine sweet: of this the surgeon indeed had apprised me, as also of the recurrence of sweetness, on her having once eaten the rind of an apple: she had not sufficient perseverance in the plan directed, and, notwithstanding we might have had some hopes from her youth, she soon afterwards died.

A clergyman from Bedfordshire about this time applied to me: his urine was suspected to be sweet, and on examination we immediately found it to be immoderately so: he was fortunately convinced also of the necessity of strict adherence to the plan laid down, which was precisely the same as that which I have before frequently mentioned; and his perseverance was rewarded by a perfect cure, for he continues well to the present hour.

Another clergyman too, much emaciated and exhausted, tried the same plan, with-

out the same fortunate result: his urine was very sweet indeed, leaving white spots or marks, like lime, on his black stockings, wherever it might happen to be sprinkled: he was very impatient, and inattentive to the method prescribed; but I should not have thought it probable, even under a more favorable adherence to regimen, that he could have received benefit, as he seemed to me, on our first interview, to have been then beyond the reach of medicine: the peculiar hay-like odour in this gentleman very perceptibly issued from his person: he was anxious to try the efficacy of the Bristol Wells, to which I could not withhold my assent, where in a few weeks he died.

The next case to the above, was that of a clergyman also, who came from Northamptonshire, to his brother's house in the vicinity of the Foundling Hospital, for the

purpose of being under my care: all the symptoms of Diabetes were here present to a very considerable degree, and therefore I will not unnecessarily extend his history by repeating them. The usual means of relief, so often mentioned, I strenuously urged and insisted upon; and, in proportion to his compliance, his water always became more urinous, and the scent from his body less perceivable. This gentleman was so suspicious, that I never found it possible to say a word to his relatives respecting him, (except when I called upon his brother-in-law in the city, for that purpose) as he always took care to receive me as soon as I entered the house; to accompany me from room to room; to examine the urinous discharges along with me; and after I had written the prescription, or made the necessary arrangements for him, to attend me to the door, and see me safe in my

Chariot again: I mention these particulars as illustrative of that state of mind, which I consider so highly characteristic of Diabetes, as to have induced me to admit it into its definition. The following letters which I received from him will explain the progress of the disease much better than any language of my own, and will at the same time shew the method that I wished to pursue for his relief: I cannot say that my expectations were ever greatly raised respecting his cure, notwithstanding his urine soon ceased to be saccharine; for, upon any slight deviation from a strict regimen, the sugar always was manifested again; and he was originally so much wasted, that I supposed, under even a more favorable conformity to my plan, the chances of success were (as the event proved) against him: added to this, although he had not passed the middle age, the stamina did not seem

ever to have been strong; for as one commonly expresses it, I should have thought him old for his particular period of life. The first letter is dated from his residence in the country, June 8th, 1806, and is as follows:—

"In ready and grateful compliance with your kind wish, I sit down to inform you that I have every reason to think I am in a state of progressive, though but of slow amendment; my fever, I am sometimes inclined to hope, has entirely left me, at others I find accidentally my tongue rather white, though I feel no thirst, and little or no dryness on my palate: my urine, I think, altogether changed for the better, and very seldom, if ever, more in quantity than it perhaps is naturally to be expected from the proportion of both water and milk that I in general drink. I have adhered hitherto most rigidly to the system of living you

prescribed me, and am ready to persist in a perfect compliance with it, if you still think it right that I should not deviate; though I could wish sometimes for the indulgence of a piece of bread, in which case I could eat more butter, an article you seemed to recommend; and a custard, when I may accidentally meet with it, as it has nothing in its composition beyond eggs and milk, saving a very small portion of sugar. You said, when I deviated, it should be by eating a small quantity of rich pie-crust: now, might I eat now and then of rich puff-paste, made into small cakes? I am sorry to say, my bowels have not yet recovered their proper tone of action, still retaining a degree of costiveness, though I have had no occasion to apply to castor oil for nearly a fortnight. My friends all assure me I mend very much in my appearance: I wish I could say I gained strength, but

that I do not so fast as I am inclined to wish or hope I might. My apothecary, I flatter myself, will deliver you this: should he be fortunately enabled to do so, you will learn some particulars from him. You objected to my drinking asses' milk, when my bowels were in a lax state, from its possessing a purgative quality; but now, as I am rather of a costive habit, my wife is very anxious and pressing that I should again ask you whether the taking of it would be improper. One cause of my not feeling so well and alert at this time, as I might otherwise do, is probably the oppressive heat, in my weak state; and another, the suffering severely from boils and swellings in my gums and face, arising I presume from something scorbutic, to which I have been always subject. I know of nothing more that my case requires me to communicate, and therefore," &c. &c..

The next letter is from the same place, dated "July 10, 1806."

"My apothecary having intimated to me, that you would wish to hear how I am going on, I gratefully accept the invitation; and am happy to say, that my friends, one and all, compliment me on the improvement of my looks; and I flatter myself with feeling some amendment in flesh and spirits, though I cannot say much as to the strength: that I gain but slowly. The quality of my urine accidentally varies, though not much: the quantity, I am inclined to think, not more than I might expect, when I consider the proportion of fluids I take in the day: at six in the morning I take a good half pint of asses' milk, soon after which I proceed to the (chalybeate) spa, where a little after seven I drink nearly half a pint of the water, and pocket two bottles, which serve me for the day,

that is, for my meals: about nine I breakfast upon three eggs and a pint of cow's milk: about six in the evening, if at home, I again take the asses' milk; and a little after seven, when the family go to tea, I have a pint bason of cow's milk: I eat no bread at either dinner or supper, and only a few thin slices at tea; but in consequence of my apothecary saying I might eat a little bread, I have ventured to eat frequently of plain batter-puddings, and of plain suet-puddings for variety. I have a good appetite, but not a voracious one. I cannot complain of thirst, but I have too frequently a dryness upon my palate, and in my mouth, and my tongue has too often a degree of whiteness upon it; but this I impute to the heat of my body, which I suppose arises from a most determined costiveness that I cannot find means to conquer, and which occasions me great pain

and misery, frequently feeling an inclination, without the ability of discharging; and when, after much difficulty, the excrement is ejected, it has almost the solidity of lead: agreeable to your advice I took at first castor oil, repeating the dose to four times one day, without effect, and was at last obliged to apply to the apothecary for a clyster; after which, nauseating the oil, I took for some time, once a day, that is to say, at going to bed, two or three teaspoonfuls of Epsom salt, and this without much relief; and of late I have taken, in the same way, about the same quantity of soluble tartar, being less stimulant, but with no better success. I regularly take your medicine three times a day, as prescribed; and as I believe you made no memorandum of it, it may not be improper if I transcribe it:—it is, Myrrhæ pulv. ʒss. Aquæ Kali pp. gⁿ x. Ferri Vitriolat. gr. vj. Aquæ distillat.

℥ iss.—I have it made in considerable quantity, measuring the dose by the phials I had in London; and I have now three quart bottles of it by me. As you recommended butter, I eat it plentifully: in my letter by the apothecary I enquired whether I might eat rich puff-paste, but he brought me no answer: if allowed, I could have it made as for tea-cakes, and to eat one or two occasionally. I have been tempted once or twice to eat a spoonful or two of thorough ripe strawberries and raspberries, and cannot say I perceived any ill effect; but, if you should think me wrong, I will not do so any more: I eat no sugar with them, only a little cream. I remain," &c.

It may be merely necessary to state, that for many weeks afterwards he continued (although imperfectly) to follow my advice, when he sunk at last under the accumulating distresses of his disorder.

The three next cases may be said to be still my patients, as they continue under the regimen prescribed for them; or if they are deviating from it, they remain as examples not merely of the efficacy of the plan, but of the durability of the cure:—The first was a gentleman from Kent, who consulted me more than a year ago, for indigestion and a bilious irregularity. In March, 1809, he called upon me with every symptom of Diabetes; and in addition to the large quantity of water, and the usual thirst and voracious appetite, he complained of a wasting of his pudenda, and of absolute impotency; circumstances which I believe to happen not unfrequently in Diabetes, notwithstanding I have not hitherto made such the subject of particular enquiry: I ordered him upon the chalybeate plan, and enjoined him the usual strict regimen with respect to diet: I was to see

him again, or hear from him in case of necessity: but not hearing from him I wrote to him, expressing my anxiety about him, which brought him to London:—He then candidly acknowledged, that he had not tried the plan, for that he had taken it into his head that nothing could be of any service to him. I remonstrated with him most strongly, and shewed him his danger; and on his return to Rochester, he commenced his plan, for his apothecary some time afterwards informed me, in a letter dated Oct. 27, 1809—"Our patient, Mr. S——, is perfectly recovered, from the plan you recommended."

A gentleman who resides in Surrey, upwards of sixty years of age, was also, a year ago, relieved by a similar plan; for, in about three weeks, his urine, and thirst and appetite, became natural, and his emaciation was succeeded by flesh and strength;

In the following year, 1809, the symptoms returned, and the same treatment was pursued with the same fortunate result; for his urine, which had again become sweet, soon was found, upon evaporation, to contain not a particle of sugar, and his health, in proportion, improved. It may not be improper to mention, that I found it necessary to secure rest at night by means of ten grains of the compound powder of ipecacuanha.

The next case is that of a gentleman's housekeeper in Portland Place, who states her complaint to have arisen six years ago. About ten years since, one of her breasts was removed, from an apprehension of cancer. Her age is above sixty. Her urine was very sweet, and in large quantity, and very frothy, and when spilled upon the ground, left an incrustation like chalk, in appearance, but which was, in reality, a

saccharine crystallization. — The peculiar odour from her body and her lungs was here remarkably characteristic of her complaint: but this, as well as the other symptoms of the disorder, admitted of a change in less than two days: — She had complained of an uneasiness and weight at the stomach, which was removed by a bolus of the hydragyrus cum cretâ, given for a few successive nights, and then the strict animal diet, with forbearance from all sorts of vegetables, and from fermented liquors, together with the common steel draught, with myrrh, three times a day, was persevered in most accurately; the change almost immediately took place for the better, and her health, more than could have been expected at her time of life, is manifestly improving:—After persevering about three weeks, rigidly, in the plan prescribed, I indulged her with beer at her meals, and

with potatoes, and had the satisfaction of finding no sugar reproduced in her urine: In a few days she used stale bread, (for she had fancied that new bread had a tendency to bring back the disease) with the same happy result: and was then directed to eat any sort of vegetables she pleased, adapting the quantity to her usual portion of animal food; and, after a trial of ten days, she experienced no renewal of her disorder. After the expiration of two months, I saw her again, without any symptom of the complaint whatever; and again, after an absence of several more months, still continuing in a perfect state of health.

Whilst these pages were preparing for the press, I was consulted for a young lady in the neighbourhood of Liverpool, who was labouring under the worst description of saccharine Diabetes:—She certainly ex-

perienced considerable relief during several weeks from the full plan of animal diet, chalybeates, and the phosphoric acid, but ultimately she fell a victim to her disorder: In the last stage of the disease I visited her at her father's house, and I think I never saw emaciation so extreme, nor patience so constant, nor attention to the plan of regimen so scrupulously exact, as in this amiable and exemplary young lady.

I was also, about the same time, consulted by a gentleman near Somerset House, in the Strand: He was about sixty years of age: His skin was cold and harsh; and his pulse small and frequent: He made water very often, but it was not at all sweet; and on evaporation it yielded plenty of crystallized salts, leaving a bitter and offensive residuum. His appetite was moderate, and so was his thirst, but his de-

bility and emaciation were excessive; and his nervous irritability, which seldom suffered him to sleep, had terminated in a slight paralysis, affecting the organs of speech, and the whole of his right side. His case seemed to me to want nothing but the saccharine Characteristic to constitute it a true Diabetes, and I accordingly ordered him eggs instead of bread, milk and broth instead of tea, and animal food under any form he pleased, and the exclusion of all vegetable and fermented matters; and his medicine was the myrrh draught, with the sulphat of iron. Although I had not much expectation of doing him good, I had the satisfaction of finding him better in a few days; and, after visiting him, perhaps twice a week, for about a month, I requested him to remove to Hampstead, for the benefit of the chalybeate water, and where he might have the opportunity

of exercise in a fine air. This, however, he neglected to do; and, during my absence from London at my house in the country, I found that he had deviated altogether from the plan advised for him, and that a fresh attack of palsy had terminated his existence.

A clergyman, also, from the neighbourhood of Harrow, consulted me for a dropsy. He was advancing in years, his debility was great, and his legs were much swoln: I found, however, that his appetite was very good, and his complexion clear; and that, independent of his extreme weakness and the tumefied legs, he was apparently in health: On examination, too, it was discovered that his urine was in greater quantity than is usual, but that it neither to the taste, nor on evaporation, yielded any sugar: Still I was not convinced that his dropsy could arise from any other cause

than from nutriment carried out of the system, and from the debility consequent thereupon. With much difficulty I persuaded him to enter upon a strict course of animal diet, and to take Chalybeates, and to treat it as a case connected entirely with a diabetic origin. In this I soon found that I was seconded neither by my patient nor by his apothecary; for the appetite becoming more moderate, had alarmed both of them, and conceiving otherwise of the complaint than I had done, the patient's wish to deviate from the plan was soon settled. My opinion, however, remaining firm upon the subject, and the reasons for it impressed as forcibly as I was able, to which, indeed, the declining condition of the patient was a strong argument; both of them at last concurred with me most readily, and in a very short time the patient, from a strict compliance with his

medicinal and dietetic plans, found considerable advantage; and I had great pleasure in finding, that, by a perseverance for a few weeks, his legs became perfectly relieved from the swellings, and his strength was much increased. On the first of August I saw him in his way to the sea-coast, which I had desired him to visit for a month or six weeks, and to persist still in the use of some chalybeate pills, mixing his diet, but still giving a preference to all sorts of animal nutriment; for I found that for the last week or ten days he had already, with my permission, taken a mixed food of animal and vegetable matters, with some beer, and a little wine, and there had been no return of his complaints. In his way from the sea-coast I had the satisfaction of finding him much restored.

Within the present year, also, I have been consulted about several cases of Dia-

betes :—A lady in Surrey-street, who had very properly been restricted, during her residence in the country, from vegetable matters, seemed to receive considerable benefit from the use of phosphoric acid, in doses from ten to twenty drops or more in common water three times a day. The urine, though in greater quantity than usual, had already, indeed, ceased to be saccharine, but the acid appeared to me to contribute not a little to her comfort, in diminishing her thirst.

A gentleman called upon me, at my own house, who had laboured under the disease for more than a year; and by the use of a strict animal diet, with phosphoric acid, has been recovered: He occasionally visits me, to confirm his own opinion of his established health.

Another gentleman, clerk to a distinguished barrister, whose urine was sweet,

and in smell, as he observed, very like that which issues from scraped carrots, after adhering to animal diet most rigidly, and using Chalybeates with the acid of phosphorus, has found his urine to become perfectly natural; and that, notwithstanding he now indulges in vegetable diet conjointly with his animal food, the Diabetes has not returned.

I might mention, too, the case of a lady, whose urine was not perceptibly sweet, but which was nevertheless far from being in a natural state, either in quantity or quality: Her thirst, and the clamminess of her fauces, were considerably mitigated by the free use of the phosphoric acid, which, together with Chalybeates, seemed at one time to promise a complete cure. On relaxing, however, from the plan, whilst in the country, whither she had returned, conceiving herself quite recovered, she experienced a relapse,

and, on her own accord, requested that she might be supplied again with the acid, as the thirst and clamminess were become most uncomfortable. I have seen her once in town since my first more fortunate attendance upon her; but as she is advanced in years, and cannot rigidly have the proper means enforced, I do not expect much advantage to be derived from any medicine, or from any plan whatever.

The foregoing details, I am afraid, will prove irksome to most of my readers; but as they are facts which, in the majority of the above histories, were again and again under my continued observation, and in all were sufficiently, by one circumstance or other, substantiated, I shall not make any apology for having inserted them. To have described that which has had actual existence, is much better than to have speculated upon probabilities; and although I

might, in many instances, perhaps, have been less prolix, yet in some it was absolutely unavoidable. In this prolixity, however, the cases have been most faithfully recorded, some of them even in the very words of the patients themselves; and arguments have been advanced, and deductions formed from them, which the judicious reasoner will examine with freedom and impartiality. From the same sources he may possibly draw very different conclusions, and, allowing the fact, still disprove the theory: but about this I am not very solicitous, for I am indeed convinced that much is yet to be done, and very much yet to be learned, before we can be said to understand perfectly this very obscure disease. The facts, unless I very much deceive myself, will always be found to be as I have described them, notwithstanding the theories, which any of us may build upon them,

may afterwards be proved to be erroneous.

One of the most prominent observations, that presses itself upon us concerning Diabetes, is its frequency in these later times, compared with that of more remote periods. Galen, from his own account, had seen it but twice: Aretæas speaks of it as a very uncommon disease: and all writers, as well modern as ancient, concur in considering it as a complaint by no means frequent. I do not mean to impeach the diligence of any man; much less would I call in question that of the venerable fathers of antiquity, who have recorded a great portion of all we even yet know in our still very obscure science; but I really believe that the Diabetes has at all times existed much more frequently than it has been thought to do, and that it yet often exists where it unfortunately eludes detection; and that

the many anomalous symptoms, which we do not always understand, proceed oftener from an unobserved subtraction of aliment from the system, than from any more commonly supposed, because more obvious fault in its general economy. But there is a circumstance which now leads us at once to more accurate investigation, and which, as it does not seem to be mentioned until the time of Willis, was probably before him entirely unknown; but although, upon his discovery that diabetic urine was sweet, we may fairly suppose that the taste was thence oftener employed, yet there can be no doubt but such trials were disgusting, and that, in process of time, practitioners contented themselves with supposing the disease from general and concurrent symptoms, (as most of us, indeed, do at present) without satisfying themselves by actual and certain experiment. Hence, I say, the disease has

often been mistaken, or at least has not been always observed, until the attempt to cure it has been beyond all possibility of success: and therefore we may conclude, that the Diabetes, which from general symptoms we may suspect, and by experiment may really know to exist, might, from the sweet taste of the urine, and from the sugar which is yielded upon evaporation, have been even in our own days much oftener discovered, and consequently much more frequently cured, if *all* the proper methods of investigation had been more narrowly attended to, and employed by us.

But as the different modes of life, at least of fashionable modern life, may be considered as increasing the catalogue of general disease, and as many disorders, which depend upon intemperance and irregular hours, are confessedly multiplied in

number, so this of which I am now treating, may, in all probability, be influenced in its frequency from similar causes: there can be no doubt, indeed, among the lower orders of mankind, that the immoderate use of spirituous liquors lays the foundation of more than a moiety of their infirmities; and on this account it has often been a matter of surprise with me, that the legislature, which must allow that the riches of a state depend in a great measure upon the health of its population, should not, by heavy duties and penalties, interdict the indiscriminate use of them as poisons, and confine their dispensation, as formerly, to the shops of the apothecaries, from whence they might be issued as other poisonous matters are, for the cure or alleviation of disease, under such restrictions as reason and experience may justify. And let me also add, that even among the higher orders

of society, the habitual use of wine is insidiously undermining the constitution of many: most of whom would shudder at the idea of taking spirit and water as their daily beverage, but do not unfortunately think that any serious mischief may generally be expected to ensue from a mixture of spirit and wine: for most of the wines, which they usually drink, contain seldom less (sometimes *much* more) than a tenth part of their bulk of brandy.

But although those who indulge in such habits are often afflicted with Diabetes, yet it must be confessed that several of the cases above enumerated could not be connected with that source; it must therefore be considered as a collateral circumstance, which may sometimes, even of itself, possibly create a disposition towards the disease, but which always, when combined with other circumstances, renders it, as far as I

have been able to judge, absolutely incurable. I think, too, that there cannot be a doubt, but diseases connected with the bladder, the prostate gland, and other parts adjacent, may now and then concur likewise as collateral causes, as one or two of the cases seem to justify me in concluding; and I believe, also, that the indulgence in an unnatural and juvenile vice may, in the same manner, in a very especial degree, determine towards the formation of this disease at a more advanced time of life, when other concurring circumstances of irregularity and disposition may co-operate to produce it.

Although it would appear, from most of the cases, which I have recorded, that Diabetes is commonly attended with a considerable desire for food, yet this symptom is not always present; and, in aged persons more especially, the appetite will become

deficient, and marasmus soon manifest itself. Hoffman, indeed, says nothing about the *urine* of such persons, whom he describes as labouring under a *fatal hectic;* but when he tells us that "the appetite fails, the strength gradually decays, the body wastes, and the bones appear like a skeleton covered with skin: when the mouth and tongue are dry, the saliva glutinous, the voice hoarse, the skin cold, parched, and rigid, the internal parts hot, the pulse hard and frequent, sleep deficient and unrefreshing; and when these symptoms increase insensibly, until in five or six *months* the patient sinks under them," one cannot help wishing that he had ascertained whether the cause of the marasmus might not possibly have existed in the constant subtraction of aliment from the system. It is true, indeed, that either from inanition or subtraction, disease, sufficient to destroy the patient, would readily

be produced; but, from the multiplicity of similar cases which I have seen, I am disposed to believe that this hectic, neither attended by colliquative sweats nor by diarrhœa, which Hoffman so ably describes, might possibly be deduced from a diabetic origin.

In some cases, also, a source of error will arise from the œdematous swellings of the legs, which, although manifestly proceeding from the great debility induced by Diabetes, or at least by that sort of marasmus which I have considered as connected with it, will sometimes be supposed to be strictly *dropsical*, and a mistaken method of treatment accordingly adopted. I mention these circumstances to shew the great necessity of accurate investigation; for it must be obvious, that the general medicines in dropsy cannot, for the most part, produce other than a very doubtful, if not

a very mischievous effect, when employed in cases which, though taken to be dropsical, are in reality those of undiscovered Diabetes, where the system is too much enfeebled already: One of the cases which I have stated is strictly in point.

There is another form of disease, under which Diabetes will sometimes conceal itself, and which, from its dreadful magnitude, is always considered as primary, although I am convinced that it is often only an effect:—I adverted, in the commencement of this work, to a peculiar condition of the mind, describing it as dissatisfied and unsteady, which usually attends a patient labouring under Diabetes; and I might have added, that such a condition will now and then degenerate into actual melancholy. Many are the instances of this species of insanity, where I cannot doubt of a diabetic disposition having been

the predisposing cause; and in a few which have been more especially under my own immediate care, I can positively aver, that such has been really the case. Sometimes the urine has been sweet, yet more commonly has it been otherwise, but still of a quality so little approaching to urinous, that, comparing it with the concomitant emaciation of the patient, and the greater appetite and thirst at the same time attending it, no physician would hesitate to declare, that the constant waste continually going on, if not from a diabetic source, proceeded from something very analagous to it: and in this most deplorable of all human infirmities, may we not indulge the hope, if I am right in what I have stated to be its occasional cause, that we may more frequently meet the advances of this species of insanity with happy effect, and fortunately arrest its progress before

it becomes absolutely incurable? In those houses for the reception of insane persons, where I know medical aid to be administered upon the true principles of medical science, we see very frequent instances of recovery from the employment of means not very dissimilar to those which I have recommended in Diabetes; and I shall be forgiven by those Gentlemen whose province particularly it is to attend upon this worst state of human misery, if I should hint it as my opinion, that, in addition to the very proper medicinal plans pursued by them, if a stricter attention was usually insisted upon in respect to diet, their practice would probably be much more successful. But this is a point which, from my own knowledge, cannot every where be carried into effect; the majority of insane houses being considered as prisons for the unhappy tenantry during life, where safe

confinement is the principal object, and where, consequently, with respect to recovery, nothing can be sufficiently pursued towards its attainment.

The causes which may more particularly influence the production of Diabetes, I will not here again attempt to recapitulate.—My opinions concerning the disease I have endeavoured to express in language as simple, and to couch them in terms as inoffensive, and in manner as little dogmatic, as possible, and I wish them to be candidly examined. Having seen the disease under every form, I am anxious that it should also be recognised by others; and, whatever fate may ultimately await my labours, I feel convinced that the spirit of enquiry will not be wanting in their examination: and I am equally satisfied that, with gentlemen and scholars, this spirit will be exercised with due zeal and proper liberality.

On the cases themselves I have not many more remarks to offer:—The accidental circumstance of labour producing perspiration, as mentioned in the very first history, and the apparent benefit resulting from it, will, I think, (when supported, as is related in another instance, by the opinion of Dr. Wall) induce the physician to attempt the restoration of its natural function to that grand emunctory of the body, the skin, whenever it may appear to have become particularly deficient: and the advantage arising from such a practice will be found in a very striking manner produced, although no ultimately good effect was the consequence, in that case where the very active febrile symptoms made it necessary, for a while, to abstain from the tonic plan then pursuing, and to adopt one more agreeable to the existing circumstances.

Without determining what influence

wounds inflicted by animals may have in producing Diabetes, yet, when manifest derangement of the adjacent parts seems to be the immediate consequence of them, and disturbance of the whole system soon afterwards follows, we must not too hastily conclude that the bite of the rat, as stated in one of the cases, had not some share in producing the extraordinary effect which the patient himself persisted in attributing to it:—the bite of the Dipsas, as recorded by Aretæus, produced, among other circumstances, such excessive thirst, as induced that venerable author to adduce it in illustration of this very disease of Diabetes. I do not know that any practical inference can be drawn from it; but it may always be proper to enquire, whenever we suspect a case to be diabetic, whether, at any period, the patient having been bitten by an animal, consequences

affecting the whole system had not followed: from my own experience, I recollect, at least, two cases, where, from a *mineral* poison, that of arsenic, by one person intentionally, in another accidentally, taken, there was for a few years previous to their death a gradual emaciation, not only attended with a disturbance of the digestive and chylopoietic organs, but with a flux of urine by no means natural: and I think it might be right for us to consider, amidst the too frequent use of the arsenical solution for the cure of intermittents, what may possibly be its ulterior effect, and, in particular, what influence it may possess, even at no very distant period, in the creation of Diabetes, or of any other chronic disease.

It may sometimes, perhaps, admit of a doubt, in female patients particularly, how far the diabetic discharge may not be con-

founded with that which often happens in hysteric and other nervous disorders. But although the taste does not distinguish any sugar, and evaporation does not detect it, yet, if micturition be *frequent* both night and day, instead of there being *occasionally* copious discharges; if the water be always very pale, and the quantity of it, though frequently made, be yet on the whole uniformly large; instead of being now and then limpid and in large proportion at once; if the thirst be generally great, instead of being usually otherwise; and if emaciation has succeeded when, from increased appetite for food, one might expect a contrary tendency—if, with all these circumstances maturely weighed, no actual hysteric paroxysm or nervous tremor be present, I think we may generally consider the case as connected with diabetic origin. Most authors, and the late very venerable Dr. Heberden in particular,

speak of a Diabetes insipidus; and I think I may be allowed to affirm, that, in some of the cases I have detailed, where sugar has not always been manifest, but where the urine, notwithstanding, has not possessed its proper character as such, yet a something necessary to the firmer constitution and crasis of the blood has been so imperfectly assimilated with it, that it has been readily separated again by the uniform and constant operation of the kidnies, and the strength of the patient therefore gradually destroyed.

As the *large* quantity of water discharged is not always an unerring criterion marking the disease, so neither is a *smaller* quantity than natural always a proof of the absence of it:—Had not taste and subsequent evaporation been employed in one of the most remarkable of those cases which I have enumerated, the patient must have

sunk into his grave, with his disease unknown to us: he would have been treated as labouring under an incurable marasmus, but the true cause of it would not have been ascertained. Such cases having occurred, will induce us, where symptoms even in a remote degree seem to indicate any thing diabetic, not to be too squeamish or fastidious in our enquiries, but to examine every circumstance that can by possibility afford us any information.

That patients, actually diabetic, have experienced a cure, from regulating the functions of the stomach and intestinal canal, I have not the least doubt, even when the nature of the disease was scarcely known, or less accurately understood; for, when to the regulation of these functions, either chance or design superadded the proper regimen, a cure was sometimes the consequence: and this happened, I think,

in that case where the Sub-Benzoat of Ammonia was given with the Opiate Tincture: and in one of the earlier cases, where relief was obtained by the female patient in the hospital.

The reader will observe, that I have seldom or never noticed the pulse in any part of the preceding pages: this has so continually varied, according to circumstances existing at the time, both in the old and the young, that nothing fixed or determinate could be deduced from it: I have therefore thought it unnecessary to remark upon it, since it could never be taken as a rule whereby the treatment should be directed. I do not know that more cases of Diabetes occur in the old, than in the middle or younger stages of life; but in those of robust constitution, I have found the disease to be usually more saccharine, and consequently more rapid:

I have found, too, that diabetic urine (its animal matter, as Dr. Rollo states, performing the part of yeast) will spontaneously undergo the vinous fermentation; for, having put aside a pint of urine, which a patient brought me for the purpose of examining its sweetness, after a space of at least five years I discovered it under the form of a clear but weak vinegar. The ready fermentation of diabetic (saccharine) urine, by the addition of yeast, is very well understood, and forms no bad criterion of the progress of a patient's disorder.

But I think, during the later periods of life, whether connected with diseases of the prostate or not, that there is often a tendency in the aliment, either under a saccharine or some other form of nutriment, to escape by the kidnies: the case marked with the interrogatory *senilis?* may, as I suppose, be so considered, not-

withstanding there were other circumstances which might concur in producing it; and there can be no doubt or impropriety in referring some of the others to that source: we shall not, therefore, take it as granted, that the constitution of every old man must necessarily be breaking up from its age, but consider whether there may not be some collateral and equally obvious cause at the same time existing, which, although always a formidable adversary, is sometimes, at least, not unconquerable.

The increase of sugar in the urinary discharges, where the patient had made sugar a principal part of his food, is a proof of the opinion I have advanced respecting the lax combination of the elementary particles of blood in diabetic cases, and of the peculiar province of the kidnies to remove all noxious or superabundant

matters from it: for the sugar did not perceptibly exist in the serum either by taste or by evaporation, notwithstanding it was taken away in greatly increased quantities by the kidnies; and it proves also, that although saccharine matter may be nutritious, yet that the crasis of the blood is not the firmer for the greater quantity eaten, but that, under such circumstances, the blood is more liable to be decomposed than when the person lives more entirely upon animal food: it proves, too, that the transfusion practised by Lower, and the physicians of his time, could not be successful, from the impossibility of such matters as they introduced into the circulation being firmly assimilated with the blood; for the kidnies would instantly have thrown them out of the body as excrementitious, even if no other inconvenience had arisen from their attempts.

But the incongruities introduced into the system by such transfusion of extraneous matters, differ not in effect from the incongruities admitted through the mediation of the stomach and intestines: both of them are unnatural with respect to their admixture with the circulating fluid, and both must immediately be removed from it, or disease will ensue: it is true, indeed, that in the former instance a fatal event is sooner to be expected, as the mixture is more monstrous; but in the latter case, too, if the unassimilated mass be not in a few hours removed by the excrementitious operation of the kidnies, the patient must inevitably perish: for poison actually forced into the circulation by aperture of a vein, is not more destructive to the body than poison which cannot be removed out of it, in consequence of renal ischury: the skin may not perform its excrementitious func-

tion, and the lungs may but in part perform their's, but still, if there be not any considerable deficiency in the secretion of the kidnies, the patient will usually recover; but if the case be reversed—if the skin be performing its functions naturally, and there be not the least discoverable difficulty in respiration, yet if the kidnies cease to perform their duty, an immediate disturbance is produced throughout the whole animal frame, and death, commonly within forty-eight hours, is the inevitable consequence. But this doctrine of excrementitious secretion is too wide a field for me to range in, and would lead me into many very important facts connected with the animal economy: I must therefore unwillingly relinquish it to those of greater leisure and ability, happy if what I have advanced from that doctrine, in the elucidation of Diabetes, should induce them to

persevere in the explanation of many obscure phenomena existing in several other diseases.

But on the subject of renal ischury, as confirming more particularly the doctrine which I have endeavoured to elucidate, I could wish to make a few additional observations:—the general fact is as I have stated it, and the fatal event happens, according to my experience, within the short time above mentioned: but although a total cessation of urinary secretion will soon terminate in death, yet, if through languor or tardiness of the particular secretory organs, depending upon the sluggish or debilitated state of the system, a very diminished quantity indeed be secreted, that very small portion being perhaps commensurate with the daily food, will consequently prove sufficient to carry out of the body any noxious substance that might

otherwise destroy it.—A young lady whom I have frequently visited, during several months, who is obstructed, chlorotic, and hysterical, and who cannot, unfortunately, retain any medicine whatever in sufficient quantity in the stomach (neither by clyster) to be of any material service to her, has not voided, on an average, more water in any one day, during all the time that I have attended her, than a fluid ounce; and this, indeed, is drawn off every second or third day, and sometimes not until the fifth day, by the catheter:—costiveness, cold extremities, head-ache, slow and weak pulse, sighings, sluggish respiration, and every mark of languor and inactivity, are present; and her daily food, which she very seldom can entirely retain, does not usually exceed more than would be sufficient to fill an ordinary sized hen's egg:—To-day, August 11, 1809, she tells me,

that her tea, in the morning, has kept upon her stomach during the last two days, and that the urine drawn off has been nearly doubled, but that she has not had a motion by stool for the last twenty days:—but this does not distress her, as she intends to procure one in her usual mode by clyster, in the evening. She is of course very feeble, and scarcely equal to any exertion, (as, indeed, has been the case with her for months) and yet the economy of the system is upheld: every function goes on, in a manner most heavily, it is true, and most tardily—but each continues to be discharged, so as to bear a due proportion to one another.—I visited her, occasionally, during several months, and found her, July 6, 1810, just the same as heretofore.

The kidnies, too, may be so very much diseased in their structure, as to secrete but very little urine, and yet they shall be

equal to the discharge of their duty in carrying off the noxious matters of the system:—An architect, a friend of mine, who had been afflicted several years with diseased kidnies, constantly voiding more or less of pus in his urine, was unfortunately seized with a febrile attack at a distance from home, when he was making more than his usual exertions in his professional occupations. On his return to his family, his urine was observed to be very scanty; and, in the last two days of his life, the fluid which passed from the bladder was perfectly gelatinous, without the least admixture of urine. His indisposition altogether did not continue longer than a week, and, had it been possible to have compelled the kidnies to resume the performance of their usual, although very imperfect, duty, this gentleman would probably have recovered.

Thirst and hunger, circumstances so distressing in Diabetes, are sensations of the whole system, although, to the superficial observer, referable only to the palate and stomach:—the excessive waste produces an eager craving, and the blood is consequently replenished through the medium of a hasty digestion, and probably, also, of an imperfect chylification. And upon this part of the subject, I must take leave to differ in opinion most materially from Dr. Rollo, who seems to consider this enormous appetite as such an evil in Diabetes, as to endeavour, by every possible means, to repress it, having founded his theory, principally, upon the idea that, on this action of the stomach, depends the evolution of sugar, with the whole train of consequent symptoms: whereas I consider the appetite, however great it may be, and which I would never check by medicines,

as a natural sensation, calling into its full exercise that organ through which the constant waste of the body must be directly supplied, and without which the patient must soon inevitably perish: and I look upon the more moderate appetite which takes place usually in a few days after a strict conformity to animal diet, as the surest sign of convalescence, inasmuch as I hold it in proof, that, the blood being thereby rendered firmer in its crasis, there is less disposition in it to be decomposed, and, consequently, (as is the fact) that there must soon be a diminished discharge of nutritious matter from the kidnies. The reason, too, why diabetic persons have been found, according to the experience of Mr. Watt, (which has been verified, also, by a case lately in the Middlesex Hospital) to bear such excessive and repeated bleedings, must be deduced from the same cause: for

the stomach fortunately exerts itself to replenish the system, and repair the waste occasioned by such immoderate evacuations; and it is just as rationally concluded, that the increased appetite, under these circumstances, is morbid and unnatural, as that which occurs for the purpose of restoring strength, and renovating the system, on the recovery from fever:—Food, therefore, which is very nutritious, (and animal food has proved to be exclusively the best) and which cannot admit of too rapid a digestion, seems to be, in such cases, always the most proper; for this supplies not a sudden stream, but a continual series of alimentary matter to the blood; and, if this alimentary matter is of such a kind as can readily be assimilated with the blood, so that its fabric shall be firm, and its texture, as it were, complete, there will be no excrementitious

secretion from it beyond such portion of it as may be superfluous, or which possibly may become noxious; but, if either too much of vegetable or animal, or mineral matters, whether saccharine, or resinous, or gummy, or albuminous, or oleaginous, or aqueous, or mucilaginous, or earthy, or ferruginous, or saline, or whatever matter else may enter into the constitution of pure and perfect blood, be in such superabundance as to destroy that uniformity and equilibrium which should exist in it for the maintenance of its proper crasis, the kidnies more especially (as well as the lungs and skin) will remove, by means of their appropriate functions, such matters as are not contributing to the wholesome economy of the system: (and that such matters are constantly removed, even in a perfect state of health, nobody who takes the trouble of examining his own urine,

for a single day can doubt) and if, whilst any such superfluous or noxious matter may be removing from the blood, nothing is added to it for its support but such aliment as is capable of supplying only a similarly noxious and superfluous matter, we shall immediately see the reason why the strength of the body must soon fail, and death consequently ensue, inasmuch as the blood must daily be rendered more and more effete, from being elaborated by the glands which perform not an excrementitious secretion, but which are constantly separating fluids to be retained and expended in the body for its immediate functions and support.

With respect to the medicinal plan, in the cure of Diabetes, after proper attention has been paid to the state of the stomach and intestines, I know of nothing so certain in their effects as Chalybeates:—It

would be idle for me to mention any particular form of them, for, to those who may honour these pages with attention, I would not presume to dictate: their variety will always afford the physician a sufficient choice, and, in my opinion, he cannot chuse wrong: I have usually preferred the common draught of sulphat of iron, with myrrh, supposing that as iron is generally found in the blood, there might, possibly, be the same deficiency of it in Diabetes as is found in Chlorosis, and other diseases of debility, and that a resinous substance might add to its efficiency, by supplying, perhaps, another of the deficient elements: but probably other mineral tonics, and other resinous stimulants, may be equally serviceable, but of these I have no experience. I do not doubt, however, when that which constitutes the fomes, as I may call it, of the diabetic tendency, has been weakened

by a strict animal diet, that there may be several other methods of renovating the body, and restoring vigour to the system: for nobody will presume to say, that the vegetable superfluity, as it appears in the form of sugar, although the most common, is the *only* unhealthy superfluity which influences the constitution of the blood in Diabetes; but, as it is very probable, there may be other unhealthy matters in like manner influencing it, so there may be other efficacious methods of relief, which, in process of time, may hereafter be disclosed to us: for all knowledge is progressive, and medical science may, in time, boast, I hope, of fewer imperfections.

I have, in another part of this work, stated an idea respecting the use of phosphoric acid, and its salts; but, although my experience, however probable their efficacy, does not sufficiently authorise me

to give them an unqualified recommendation, yet I am inclined to say, that, in addition to the animal food, (which, in the early stages of Diabetes will almost to a certainty cure it) the phosphoric acid, either simple or combined, may be taken as a medicine, with considerable advantage; and that, for the purpose of restoring the vigour of the system, when the diabetic tendency has been checked, nothing would perhaps be better than iron combined with phosphoric acid, as it is found in the phosphat and oxyphosphat of that powerful mineral; and that when, from costiveness, as is very common, a purgative was wanting, soda phosphorata, or some such phosphoric salt, should always be preferred:—But my reader will please to recollect, that I am here speaking rather theoretically, and that my own experience upon this part of the subject, must be considered as

still imperfect, although I can with confidence assert, that, in chronic Diabetes more especially, I have seen the plan very beneficially employed; and that even in the more dangerous form of the disease, where the thirst has been excessive, the acid of phosphorus has greatly contributed to allay that very distressing circumstance.

I once thought that all saline medicines which might possibly stimulate the kidnies would do mischief in Diabetes, and therefore hesitated about the propriety of giving even a common saline draught, notwithstanding the heat of the body, and the immoderate thirst, might very imperiously demand it: but longer experience, and more mature reflection, have taught me, that diuretics, as they are called, do no harm in this disease: for the effect of such medicines depends primarily upon the absorptive power of the system being brought

into action by their stimulant and other qualities, which I have not sufficient time at present to investigate; and that when the superfluous and aqueous matters are, by such absorption, taken into the circulation, the kidnies will, of course, immediately remove them from it, by the exercise of their usual and appropriate functions.

And with respect to resinous substances, one might also, from their well known properties, be led to suppose, that they also would be improper in Diabetes, had we not abundant proof to the contrary, in their common combinations with the sulphat of iron, where I do not find that the diuretic effect naturally to be expected from them at all impedes the progress of the recovery of diabetic patients: it is true that myrrh is the substance usually mixed with the Chalybeate, and which does not,

perhaps, irritate the neck of the bladder so much as some other purer resinous matters, (at least in the common doses in which myrrh is usually given) but the rectified oil of turpentine, the purest of all resinous bodies, even should it stimulate the neck of the bladder, as it often does most severely, would not impede, in my opinion, by producing any such effect, the recovery of a diabetic patient; for, although a greater quantity of water might be thrown out from the kidnies, for the purpose of dislodging the irritating matter from the neck of the bladder, and although the secretion should be influenced, according to my doctrine for the removal of such matters, as either finding their way into the circulation, or being generated therein, are no longer necessary, but, perhaps, even injurious to the proper economy of the system, yet I should consider such

diuretic effect as no hindrance to the use of it, or of any other resinous substance which circumstances might seem to demand in Diabetes; any more than I should consider a similar effect upon the bladder, produced by a large dose of the same rectified oil of turpentine, any hindrance to its use in cases of worms, which, we now know, it will almost to a certainty destroy, or in cases of epilepsy, which I have several times relieved, and more than once cured, by the same remedy; and which was first given by me, under the impression that the irritable state of the nervous system disposing to that very deplorable malady, might, probably, depend upon worms or foul bowels, as a cause; but which, even independent of such a cause, may, I now think, be counteracted, by a very large dose of that, or some such resinous substance, given so as to act every where

powerfully and at once upon the whole animal machine:—The oil of amber, in particular, is, I think, upon the same principle, well adapted to similar indications.

It might be thought, perhaps, that I should have given the appearances, on dissection, of the kidnies and bladder, in several cases which terminated fatally:—I might, indeed, have done so, but nothing satisfactory having occurred from the examination of a case or two, where the structure seemed in no ways altered; and the case which Dr. Baillie has given us, although examined with the utmost accuracy, (and to which, for anatomical instruction, I shall refer the reader) affording us no very practical information with respect to the cause of Diabetes, and conceiving, also, that the source from which this disease springs must be sought for at a

distance from the urinary organs, I have long ceased to press for an examination of them, thinking that any slight or supposed alteration might be considered rather as the effect than as the cause from which the disease must be derived.

It might here be expected, also, that I should give an opinion respecting the efficacy of the Bristol waters, (which have by some been considered as celebrated) in the cure of Diabetes: but, notwithstanding common practice usually recommends them, I think it needless to send down a patient until the disease has, in a great measure, been relieved from its more oppressive symptoms. When that is the case, a patient still pursuing his dietetic plan, may change the scene, and take the Bristol waters with probable advantage: but if I am right in the opinion I have formed respecting Chalybeates, those waters which

are impregnated with iron are much more proper:—Under the same sort of limitation, alum, and other astringent and tonic remedies, may have a place in the cure of Diabetes; but, until the disease be first of all very considerably changed, by a strict animal diet, my experience justifies me in saying, that very little benefit is to be expected from any medicine whatever.

THE END.

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